THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER AND ELECTRO-PLATERS REVIEW
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## INSTITUTE OF METALS.

**The Report of the Proceedings and Abstract of Papers Read at the First General Meeting.**

The Institute of Metals occupies a similar position in Great Britain to that of the American Brass Founders' Association in the United States. Both societies were formed to promote the educational welfare of the metal industry and both organizations are very young. In fact they are in their early childhood, but with every prospect of a long and useful life. THE METAL INDUSTRY has been pleased to record the birth and growth of the American association and in this issue has the pleasure of recording the proceedings and papers of the first convention of the British institute. We believe that a record of the work accomplished by each society will afford a useful comparison and stimulant to each.

The institute was happy in the selection of its city for the first meeting—Birmingham—which city has been the center of the metal working industry of England for centuries and to-day is the greatest metal goods workshop of that country, exporting its metal products to every part of the world.

The programme of the proceedings of the society was very much like one that would have been issued in America, though an examination of all the printed matter relative to the meeting shows the thoroughness of the arrangement of details. More care was apparently given to this end of the convention work than is the custom in America. There were complete announcements for every event at the general meeting. The programme as outlined called for the assembling of the members in the Municipal Technical School of Birmingham at 10:30 a. m. Following the assemblage there was a reception by the Mayor. In the afternoon the members visited the new university buildings of Birmingham. In the evening there was another reception by the Mayor at the hotel headquarters.

The second day's proceedings were given over entirely to the reading and discussion of the papers and these papers were particularly interesting to the various branches of the metal industry. They were as follows:

The Institute of Metals: Its Origin and Objects, by Sir William White.

The Mechanism of the Annealing Processes for Certain Copper Alloys, by G. D. Bengough and O. F. Hudson.

The Nature of Inter-Metallic Compounds, by Cecil Desch.

Aluminum and Some of Its Uses, by J. T. W. Echevarri.

Some Points of Interest Concerning Copper and Copper Alloys, by J. T. Milton (Engineer Surveyor Lloyds' Register of Shipping).

Some Notes on Phosphor Bronze, by A. Philip (Admiralty Chemist).

Plant Used in the Manufacture of Tubes, by W. H. A. Robertson.

Metallographic Investigations of Alloys, by Walter Rosenhain (National Physical Laboratory, Teddington).

Before the reading of the papers a feature of the meeting was the exhibit by G. A. Boeddicker, chairman of the local committee on "The Diseases of Metals." This exhibit was divided into the various classes of: First, "Impurities"; Second, "Wrong mechanical treatment in casting, rolling, annealing, working up, etc."; Third, "Wrong Mixture"; Fourth, "Any other defects, the cause of which is still unknown." The cause and remedy of the defects was left to the various exhibitors to describe.

The papers were of such length that it is impossible to publish them entirely and following the report of the proceedings we print abstracts of the ones of most interest to American readers and believe that it would be to the advantage of all metal manufacturers to send to the secretary for complete copies. All correspondence should be directed to The Secretary of the Institute of Metals, The University, Edgbaston, Birmingham, England.

### WORKS VISITED.

The members had the opportunity to visit a variety of metal works. The following is a list of the works to which members were admitted on production of a ticket bearing their signature:

The Birmingham Aluminium Castings (1903) Co., Ltd.
The Birmingham Small Arms Co., Ltd.
The Birmingham Metal and Munitions Co., Ltd.
James Cartland & Sons, Ltd. (brass founders).
Earle, Bourne & Co., Ltd. (metal rollers).
Elkington & Co., Ltd. (electro-platers).
Joseph Gillott & Sons (pen makers).
Muntz Metal Co., Ltd. (metal rollers, etc.).
Hy. Wiggins & Co., Ltd. (nickel rollers, etc.).
Wolseley Tool and Motor Car Co., Ltd.

### THE OFFICERS.

The president, Sir William H. White, is known throughout the engineering world as the creator of the modern British navy. For years he was the chief constructor for the admiralty. In 1902 on account of ill-health he resigned his position as chief constructor and since then has taken a great interest in engineering societies. In speaking of the work of the institute in his opening address, Sir William said:

"The objects of the institute are defined in the rules as follows:

"(a) To afford a means of communication between members of the non-ferrous metal trades upon matters bearing upon their respective manufactures, excluding

all questions connected with wages, management of works and trades regulations.

"(b) To arrange periodical meetings for the purpose of discussing practical and scientific subjects bearing upon the manufacture, working and use of the non-ferrous metals and their alloys.

"(c) To advance the knowledge of metals and alloys, *e. g.*, by the publication of a journal containing both original papers, and abstracts of publications relating to these subjects, and in any other way.

"No one can doubt that frank conference and discussion, such as this institute will encourage, may lead to a reconsideration of many conclusions regarded hitherto as definite and final. At present many difficulties and failures which occur in the use of metals arise from causes that remain obscure and demand thorough investigation. In some cases the relative attitude of the parties concerned has been marked by an assertion of personal opinions or individual rights, rather than by that scientific spirit which would put into the first place the pursuit of truth and its declaration at all costs. It will not be supposed that I ignore business interests, or think that they should be or can always be subordinated to scientific research. On the other hand, it will be admitted that the 'reservation of all rights' in conducting negotiations, may, and often does, prevent the solution of problems that could be solved with great ultimate advantage to both parties to a dispute. I am sanguine enough to believe that the establishment of this institute will promote the growth of the scientific spirit; and, in the end, will lead to better conditions, to freer and more cordial intercourse, to united efforts for improvement on the part of makers and users, and to the universal conviction that all classes must be benefited by an encouragement of research and the freest publication of the results obtained which circumstances may permit. If we are to succeed in this endeavor, the proceedings of the Institute of Metals must embrace contributions from users as well as makers of non-ferrous metals and their alloys; and there must be free and friendly discussion between the two classes when difficulties have to be faced or doubts removed."

The secretary, G. Shaw Scott, is twenty-four years old and a graduate of the course in metallurgy at the University of Birmingham. Mr. Scott is particularly interested in the metallurgical side of motor engineering and has made many contributions to technical literature on this and other metallurgical subjects. A further sketch of Mr. Scott was published in THE METAL INDUSTRY of October.

The treasurer, Professor Turner, is one of the best known and most popular metallurgists in the United Kingdom. A large number of experts in various parts of the world are applying in daily practice the principles and theoretical knowledge on metals advocated by Professor Turner. He is the professor of metallurgy at the Birmingham University and has patented a process for recovering acid from galvanizers' pickle. Professor Turner has published a number of papers for such societies as the Iron and Steel Institute, the Metallurgical Society, etc., and is a recognized authority on metallurgical matters.

The chairman of the local committee, Gustav Adolf Boeddicker, studied chemistry and metallurgy at Charlottenburg College and at the Royal School of Mines at Berlin, Germany. For a time he was chemist of the Iserlohn Nickel Works and afterward assistant manager of the Imperial Mint at Berlin. He also built the nickel works at Altena in Westphalia for the firm of Basse & Salve. In 1877 Mr. Boeddicker went to Birmingham and accepted a position with Henry Wiggins & Co., Limited, as chemist and then became assistant manager, afterward manager and for a number of years has been one of the managing directors. The firm's business is the smelting and refining of nickel and manufactures of German silver and chemical products.

SIR WILLIAM H. WHITE. President. G. SHAW SCOTT. Secretary. THOMAS TURNER. Treasurer. G. A. BOEDDICKER. Chairman.

### THE VICE-PRESIDENTS.

The following members were nominated by the Interim Council as vice-presidents: J. D. Bonner, N. Cookson, Professor Gowland, Gerard Muntz, Admiral Oram and Sir Henry Wiggin.

### AN AMERICAN LETTER.

A letter was read from Secretary Corse of the American Brass Founders' Association, in which Mr. Corse extended the greetings of the American society and suggested that the institute compile standard methods for the analysis of brass, to which Honorary Secretary Johnson replied that he believed the suggestion an excellent one and that two members—Dr. Carpenter and Professor Turner—would give the subject their attention.

There was an earnest discussion of all of the papers and it was the unanimous opinion of those present that the first general meeting had been a pronounced success.

## NOTES ON PHOSPHOR BRONZE.*

By A. Philip (Admiralty Chemist).

Muntz metal is a copper zinc alloy of very definite chemical composition, and possesses remarkable mechanical properties which have been well known in practice for many years. The precise relationship between definite heat and mechanical treatment of this alloy and the changes which this treatment produces in the ultimate tensile stress, percentage elongation, resistance to shock, etc., have only been investigated comparatively recently by E. A. Lewis (*Jour. Soc. Chem. Industry*, 1903, p. 12) and by O. F. Hudson and G. D. Bengough (*ibid.*, 1906, p. 503, and 1907, p. 43). The researches made by these investigators are, in fact, based upon a preliminary knowledge of the chemical and mechanical properties of a single binary copper and zinc alloy of very definite composition, whose equilibrium curve had been thoroughly investigated by Shepherd (*Journal of Physical Chemistry*, June, 1904).

Phosphor bronze is a more complicated material than Muntz metal, and on this account it is all the more important that compositions of a suitable chemical character shall be selected for carrying out an investigation of its mechanical and microscopic character, as modified by heat and work.

With phosphor bronze the range of compositions from which a selection can be made is in practice somewhat great, and is not, as in the case with Muntz metal, restricted within very narrow limits. On this account it appears to the writer that the first steps toward the selection of a suitable phosphor bronze composition upon which further investigation as to the effects of heat and work treatment can be carried out, must consist in the consideration of as large a number as possible of mechanical tests made upon phosphor bronze alloys of different known chemical compositions.

Published results of the chemical and mechanical tests carried out on the same samples of phosphor bronze are scarce, although many results of mechanical tests on material whose chemical composition is not stated are available, while conversely, results of chemical analysis have been given without the results of any mechanical tests.

The object of the present notes is, therefore, twofold: 1st, to put on record connected results of the chemical and mechanical tests of a considerable number of samples of phosphor bronze with the view of arriving at some general provisional conclusion as to the most reasonable chemical specification for this material; and 2nd, to enable, by means of these results, a selection to be made of one or more compositions upon which further exhaustive investigations may be carried out as to the connection between mechanical properties and heat and work treatment.

The results of the chemical analyses and mechanical tests tabulated here have been obtained during the past two or three years in the course of the routine survey of government supplies for the navy, and permission for their publication has been granted by the courtesy of the Board of Admiralty. The chemical tests were carried out at Portsmouth Dockyard and the results of the mechanical tests have been supplied to the writer by many of the admiralty overseers, under whose supervision they have been made, and for whose kind assistance the writer wishes to take this opportunity of recording his very cordial thanks.

All the samples the results of whose tests are here given are castings with the exception of eleven samples of rolled or drawn alloys Nos. 87 and 90 to 99 inclusive. Those samples which are described merely as castings were so described when received, and are understood generally to consist of castings of smaller size.

The samples have been arranged on the table roughly in order of an increasing percentage of copper present commencing with 82.3 per cent. of copper and rising to 99.27 per cent.

The whole of the samples may be approximately divided into five groups, namely:

(a) Drawn rolled or forged phosphor bronze, such as rods, rolled plates and sheets, rivets, wire, etc. These all contain at least 94 parts per cent. of copper, with phosphorus varying from 0.11 up to 0.4 parts per cent., the remainder being tin. The ultimate tensile of these samples is never lower than 19.7, and this sample, No. 97, consisting of rod, is probably an annealed sample, while in one sample of rod for springs, No. 95, it rises as high as 46.04 per square inch.

(b) Small Castings.—These are described as castings only, and were so described on receipt for test at Portsmouth. In general the ultimate tensile stress at which these samples broke was low, varying from 13 to as high as nearly 18 tons per square inch, while the copper varied from 82.3 to 90 per cent., and the phosphorus from 0.3 to 0.71 per cent. Owing to the difficulty of making mechanical tests on small samples and the usually unavoidable rapidity in cooling, somewhat low results are to be expected in material of this character.

(c) Bearings.—These contain from 84.5 to 91.0 per cent. of copper and 0.37 to 0.85 per cent. of phosphorus. The ultimate tensile stress varies from 7.76 to 26.4 tons per square inch, and eight out of the ten samples have an ultimate tensile of over 18.8 tons.

(d) Sheaves for Blocks.—The composition of the 25 samples is copper 87.73 to 92.3, phosphorus 0.15 to 0.73, and 17 out of the 20 samples containing more than 0.3 per cent. of phosphorus gave an ultimate tensile of over 17 tons per square inch.

(e) Gear Wheels Pinions, and Worm Wheel Rims.—These 19 samples contained from 88.5 to 95.5 parts per cent. of copper, and from 0.07 to 1.56 per cent. of phosphorus. But of the 13 of these samples containing from 0.3 to 1.0 part per cent. of phosphorus all except No. 56 gave an ultimate tensile of 20 tons or over, and No. 56 gave an ultimate tensile of 18.5 tons. These thirteen samples contain from 88.7 to 95.5 parts per cent. of copper.

From a study of these results the writer propeses the following as a provisional specification of the chemical composition of phosphor bronze casting to give in large castings an ultimate tensile of over 17 tons per square inch and an elongation on 2 in. of not less than 20 per cent.

| | |
|---|---|
| Copper | 90 to 92 |
| Tin | 7.4 to 9.7 |
| Phosphorus | 0.3 to 0.6 |

There are sixteen samples, the results of the chemical and mechanical tests upon which are given in the tables, namely, from No. 61 to No. 82 inclusive, whose chemical composition agrees with the above proposed specification, and of these sixteen samples one only, and that a small casting, failed to give 17.5 tons per square inch as an ultimate tensile stress or a percentage elongation of less than 20 per cent. on 2 inches.

The above proposed specification is very close to the specification adopted by the admiralty in 1905 for phos-

*Paper read before the Institute of Metals.

phor bronze material used in the construction of H.M.S. *Dreadnought*, namely:

Copper .....90
Tin .....9.7
Phosphorus .....0.3

This composition was required to give an ultimate tensile of 17 tons per square inch and an elongation of 15 per cent. on a 6in. length, and to withstand bending over a 2-in. bar until the two sides were parallel without any cracking taking place. This 1905 admiralty specification was not, however, based upon the results given in this paper, and it is of interest to see how closely two independent estimations of the best probable chemical composition have agreed.

Some specifications for phosphor bronze compositions with which the writer is acquainted specify the amount of phosphorus to be present in terms of the amount of copper phosphide or tin phosphide employed in the mixture for melting. This method of specification is unsatisfactory on account of its ambiguity. One specification of this character specifies the amount of phosphorus and copper to be employed in manufacturing the copper phosphide used, but notwithstanding this it is not possible by this means to secure that the copper phosphide, or still less the final phosphorus bronze alloy, shall contain the definite amount of phosphorus required, because indefinite amounts of phosphorus must be lost first in the manufacture of the copper or tin phosphide, and secondly in the melting and casting of the phosphor bronze itself. The only satisfactory method of specifying the amount of phosphorus is to specify the percentage which is to be present in the finished metal, thus allowing the manufacturer himself to proportion his additions of phosphorus in such a manner as to secure the final necessary percentage. Such additions must, of course, vary with the particular practice of melting, etc., adopted.

For phosphor bronze rod, sheet or wire the following specification is indicated by the results given on the table:

Copper .....94.5 to 97.5
Tin .....Remainder tin.
Phosphorus .....0.10 to 0.25

Ultimate tensile stress when unannealed over 30 tons per sq. in.

Percentage elongation when unannealed over 10 per cent on 2 in.

Ultimate tensile stress when annealed over 20 tons per sq. in.

Percentage elongation when annealed over 40 per cent. on 2 in.

For phosphor bronze bearings the amount of phosphorus undoubtedly should be high, but what the particular best limits should be the writer is not prepared to state definitely, but it should probably be from 0.8 to 1.0 per cent., or possibly higher.

From the results of the chemical and mechanical tests recorded in this paper there appears to be some indication that in a given phosphor bronze alloy of definite composition containing from 88 to 90 per cent. of copper, the raising of the amount of phosphorus present tends to somewhat raise the ultimate tensile stress, but at the same time lower the percentage elongation of the material. Probably the percentage elongation of alloys used for bearings need not be very high, but hardness, or at least a low co-efficient of friction is of chief importance. The secret of the value of phosphor bronze for bearings is, in fact, probably due chiefly not to its high ultimate tensile, but to the fact that, as will be pointed out more in detail later, the high phosphorous bronzes consist of a network of a hard copper phosphide supported and held together in a matrix of a softer copper tin alloy. The bearing surface of the journal is actually this skeleton of phosphide, which possesses a low coefficient of friction for most other metals, and whilst sufficiently hard to resist abrasion, has its somewhat brittle character rectified by the surrounding and supporting matrix of copper tin alloy.

The following table, which gives the results of chemical and mechanical tests made upon all samples of phosphor bronze now under consideration containing over 0.7 per cent. of phosphorus, is of interest, as calling attention to the general properties of bronzes of higher phosphorus content of different compositions.

RESULTS OF CHEMICAL AND MECHANICAL TESTS ON PHOSPHOR BRONZE ALLOYS. CONTAINING OVER 0.7 PARTS PER CENT. OF PHOSPHORUS.

| Rotation No. | Mark on Sample. | Character of Sample. | Results of Chemical Tests. Copper. | Tin. | Zinc. | Phosphorus. | Ultimate Tensile in tons per square in. | Percentage Elongation on 2 inches. |
|---|---|---|---|---|---|---|---|---|
| 2 | 1277.T.08 | Bearings ..... | 84.5 | 14.5 | Nil | 0.86 | 7.76 | 1.0 |
| 4 | 2055.T.06 | Piston Packing Ring | 85.6 | 10.84 | 2.74 | 0.82 | 8.5 | 3.0 |
| 7 | 54.T.05 | Gear Wheel ..... | 86.8 | 12.2 | Trace | 1.43 | 13.4 | 4.5 |
| 8 | 53.T.05 | Ditto ..... | 87.0 | 12.0 | Ditto | 1.56 | 13.94 | 7.0 |
| 15 | 1168.T.05 | Piston Packing Ring | 87.7 | 10.7 | Nil | 0.97 | 23.2 | 6.0 |
| 27 | 1424.T.08 | Bearings ..... | 88.9 | 10.15 | Ditto | 0.82 | 18.8 | 10.0 |
| 29 | 1282.T.08 | Bush ..... | 88.9 | 10.3 | Ditto | 0.77 | 19.0 | 12.0 |
| 34 | 517.T.08 | Castings ..... | 89.0 | 10.2 | Ditto | 0.71 | 16.4 | 11.0 |
| 41 | 1149.T.08 | Bearings ..... | 89.7 | 9.4 | Ditto | 0.78 | 20.2 | 12.0 |
| 42 | 1205.T.05 | Ditto ..... | 89.2 | 9.6 | Ditto | 0.71 | 20.1 | 15.0 |
| 59 | 1423.T.08 | Ditto ..... | 89.1 | 10.1 | Ditto | 0.72 | 18.1 | 11.0 |
| 68 | 8159. 04 | Sheaves ..... | 90.4 | 8.96 | Ditto | 0.73 | 18.5 to 20.0 | 24.0 to 26.0 |
| 85 | 1171.T.07 | Worm Wheel Rim. | 94.2 | 4.9 | Ditto | 0.96 | 25.0 | 28.0 |
| 86 | 1173.T.07 | Ditto ..... | 94.4 | 4.8 | Ditto | 0.98 | 24.8 | 36.0 |
| 88 | 1172.T.07 | Ditto ..... | 95.5 | 4.95 | Ditto | 0.95 | 24.6 | 34.0 |
| 89 | 1710.T.07 | Ditto ..... | 95.2 | 3.82 | Ditto | 0.86 | 22.9 | 43.0 |

EFFECT OF THE PRESENCE OF VERY MINUTE TRACES OF PHOSPHORUS UPON GUN METAL.

It is frequently claimed that in a phosphor bronze casting, it is only necessary that the most minute traces of phosphorus shall be present in order that the material shall possess all the best qualities of a phosphor bronze. Although it is not considered that this claim is correct, yet it must be freely admitted that very small traces of phosphorus in gun metal alloys are frequently accom-

panied by remarkably satisfactory mechanical properties. This is particularly shown by the following tabular statement of the chemical composition and results of mechanical tests on six samples of so-called gun metals. These samples were originally tested as gun metals, the amounts of copper, tin, lead and zinc alone being determined. On the receipt of these analytical results the overseer who had sent the samples for test wrote stating that all these samples exhibited exceptionally high and uniform tensile and elongation tests, and, asked as to whether any explanation could be given; it then occurred to the writer that phosphorus might be present, and on being looked for it was found in very minute traces (less than 0.005 per cent.) in all the samples. The general effect of phosphorus is apparently twofold; firstly, it removes any oxygen present in the alloy, thus improving its ultimate tensile and elongation tests; and secondly, further additions still further increase its tensile and elongation tests up to an amount as high as about 0.7 per cent. of phosphorus and at the same time increases its hardness, as measured by resistance to abrasion by a file. It has been the writer's experience during recent years that it is tending to become a general practice to add minute traces of phosphorus to gun metal alloys in which its presence is not required by specification, in order to secure more satisfactory mechanical tests.

MECHANICAL AND CHEMICAL TESTS ON GUN METALS CONTAINING TRACES OF PHOSPHORUS.

| Laby. No. | Stamp No. | Ultimate Tensile in tons per sq. in. | Elongation per cent. on 2 in. | Reduction of area per cent. | Copper. | Tin. | Zinc. |
|---|---|---|---|---|---|---|---|
| 3177.T | T.1 | 19.5 | 21 | 20 | 86.6 | 11.8 | 1.6 |
| 3178.T | T.2 | 19.8 | 20 | 23 | 86.6 | 11.4 | 2.0 |
| 3180.T | T.5 | 19.7 | 32 | 30 | 86.7 | 11.7 | 1.6 |
| 3176.T | G.1 | 19.0 | 24 | 23 | 86.8 | 11.4 | 1.8 |
| 3181.T | G.3 | 20.5 | 25 | 25 | 86.5 | 11.8 | 1.7 |
| 3179.T | G.5 | 19 | 27 | 29 | 87.0 | 11.5 | 1.5 |

A trace of phosphorus (less than 0.005%) was present in all these samples.

PHOSPHOR BRONZE WIRE OF SPECIAL COMPOSITION.

The present Admiralty specification for phosphor bronze wire for braiding electric cables requires it to be made of a mixture of pure tin, not less than 5 per cent., and pure copper, and to have a breaking stress of not less than 20 tons per square inch of section, with an elongation of not less than 42 per cent. in a length of five inches.

As a matter of interest the analysis of a sample of phosphor bronze wire for braiding electric cables is here given, viz.:—

| | End "A." | End "B." |
|---|---|---|
| Copper ..... | 92.850 | 92.900 |
| Tin ..... | 6.500 | 6.550 |
| Phosphorus ..... | 0.314 | 0.322 |
| Lead and zinc..... | Absent | Absent |
| | 99.664 | 99.772 |

The analyses were made from samples cut from opposite ends of a 3-ft. length. The composition exhibits remarkable uniformity, and the chief interest which attaches to it is that two or three makers have stated that such material cannot be manufactured, as it contains too much tin and too much phosphorus. The results of the mechanical tests on this material are unknown, but, as may be noticed by examining the sample exhibited, it possesses remarkable toughness and resistance to bending fracture.

SPECIAL CHARACTERISTICS OF PHOSPHOR BRONZE.

The special characteristics of phosphor bronze are:

(1) Its freedom from corrosion by salt water, which is apparently largely due to its freedom from zinc.

(2) Its high qualities as a mechanical constructive material as compared with an ordinary zinc-free bronze.

(3) The small effect which rise of temperature has upon its mechanical properties, which remain practically unimpaired at temperatures at which zinc containing copper alloys exhibits serious drops in strength.

(4) A spark cannot be readily obtained from it by a blow.

(5) Phosphor bronzes of high phosphorus contents possess low friction coefficients for most metals, and are hard enough to resist abrasion well.

On account of the above properties, phosphor bronze is particularly suited for boiler fittings and for fittings exposed to sea water, for the construction of machinery for manufacturing explosives, and for bearings for high-speed machinery.

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## AN ANCIENT BRASS WORKS.

INTERESTING BIRMINGHAM RELIC.

(By Our Birmingham Correspondent.)

By the courtesy of W. J. Davis, the Secretary of the National Society of Amalgamated Brassworkers, which has its headquarters in Birmingham, England, we are able to reproduce a picture which adorns the wall of his office, representing the second known brass-works in Birmingham. The ancient name given to it is "The Birmingham Brasshouse" and the site is still commemorated by a narrow street, "Brasshouse Passage," connected at right angles with the important thoroughfare of Broad street.

It should be explained that this is not quite the oldest brassworks in Birmingham. A most interesting feature of the oldest existing pictures of Birmingham is a dome-like erection very suggestive of a pottery furnace or glass house identified on the picture as "Mr. Turner's Brass-works." This was situated in Coleshill street in 1740. It

OLD BIRMINGHAM BRASS WORKS.

is only a stone's throw from the heart of the city, and the importance evidently attached to it by the Birmingham folk of that time is shown by its conspicuous appearance among such notable structures as St. Phillip's Church, St. Martin's Church, the Bluecoat School, and other structures now regarded as the city's most interesting antiquarian relics. Hutton, the most ancient of Birmingham's historians, mentions the founding of this concern. The historian says that it stood 200 yards beyond the buildings, which means, of course, that it was surrounded by fields. When he wrote he remarked somewhat sadly, "Now the buildings extend beyond there by half a mile."

For generations past, this has been the most thickly populated part of Birmingham, and the buildings extend solidly for quite three miles beyond. Of the trade at that time the quaint historian writes:

"The curious art before us is perhaps less ancient than profitable, and less healthful than either. I shall not inquire whose grandfather was the first brassfounder here, but shall leave their grandsons to settle that point with my successor, who shall next write a history of Birmingham. Whoever was the first, I believe he figured in the reign of King William. But though he sold his productions at an excessive price, he did not, like the moderns, possess the art of acquiring a fortune; but now the master knows the way to affluence, the servant to liquor."

Another historian mentions that at this time the fame of the brass articles, although their finish was imperfect, had spread to the larger towns of the Empire, and that customers when they placed their orders used to produce the cash from their saddle bags, pay for what they had, take their limited purchases away in the same receptacle, or if too bulky had them forwarded by the first carrier's van drawn by four horses.

The special interest of the brasshouse which forms the subject of our sketch arises from its origin in an old "copper ring." In the year 1780 a crisis arose through a combination of manufacturers, "the brazen sovereigns," as they were called, who suddenly rushed up the price of brass ingots from £72 to £84 per ton. The principal brassfounders in Birmingham met at the "Swan" in Bull street, and issued a notice to their customers that they were "under the disagreeable necessity of advancing the price of brassfoundry goods 7½%." There were 19 signatures attached to the notice. Many of them are Birmingham names which are still familiar, but six of them were names which appeared six years earlier in what was then called "The New Birmingham Directory & Gentlemen's & Tradesman's Compleat Memorandum Book." Of the 36 brassfounders in that Directory some are set down as makers of clasps, nails, candlesticks, etc. According to Aitken there were 30 brassfounders in the town at the date of the meeting. The result of the conference was a determination not to be ruled by "the brazen sovereigns," but to have a brasshouse of their own. As the result of a meeting at the Royal Hotel £20,000 was subscribed and the new brasshouse was erected by "Ye banks of ye canal" in Broad street. The works for many years were made conspicuous by the six square sharply tapering chimneys which blackened the town with smoke, and each of which covered a couple of furnaces with their full complements of "king pot" and eight satellites. It should be explained that the old process of brass melting was carried out in an enormous dome-like furnace, strongly resembling the modern glass house. Eight pots stood round the interior, with a larger or "king pot" in the middle, and the whole were charged with ground copper, calamine and coal in certain proportions "levigated" with water. The melting of the charge occupied 12 hours, when the contents of the small pots were emptied into the king pot, put back into the furnace, and melted again, after which the metal was skimmed and poured into moulds or ingots or plates. Two tons of copper and three tons of calamine made three tons of brass, or as it was expressed "the copper became brass by absorbing calamine and increased its weight one-half." Four different qualities were made, of which one was specially applicable to the manufacture of pins.

Additional historical interest is given to this venture by the share which Boulton, of the famous firm of Boulton & Watt, had in it. But his connection was short; he retired because the new company declined to follow his advice. His prediction that the new concern would cause a drop in the price of brass proved correct, the market value falling from £84 to £56 per ton. The Birmingham Brasshouse never achieved success, and in 1831 was bought up by Thomas Pemberton. For twenty years longer, however, it continued to turn out calamine brass, but the buildings and land were disposed of to the Birmingham Waterworks Company, and the last of the six chimneys was demolished as late as the year 1866.

The bridge which adjoined the old works became the site of the handsome and imposing Church of the Messiah. The old works offices are still occupied by the Corporation Water Committee, though it is likely that they will be finally vacated a year or two hence when the new city offices are completed. The picture is supposed to have been drawn about 1790, and the present frontage of the building bears a sufficient resemblance to the ancient appearance to suggest that little alteration has taken place.

We are indebted for the above particulars largely to the "Short History of the Brass Trade," of which W. J. Davis is the author, a very handy little publication in which Mr. Davis has equally shown his special knowledge and his careful study of the history of this typical Birmingham industry.

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## WHITE METALS AND SHOP SECRETS.*

By J. T. Milton.

In the case of white metals, as with other metals, the rate of cooling has an enormous effect upon the crystallization and structure of the metals, and this ought to be realized by the users of these metals. As was suggested in the case of gun metal castings, the rate of cooling is considerably affected by the temperature of pouring and the temperature of the bearing into which the metal is poured, yet sufficient attention is not given to this, the matter being left to the ordinary workman, who is never a skilled metallurgist. More than one case of bad results obtained with a metal known to be of suitable composition can be attributed to this cause.

The opinion prevails amongst some engineers who make their own white metal that the quality is influenced by the order in which the various metals are melted and combined. The author made some experiments on this point on a metal of the tin-copper-antimony type by making a metal of definite composition by three separate sets of steps, all different from the orthodox method. All of course resulted in metals which, when fused, possessed the same chemical proportions, and when the resulting metals were cooled out under identical conditions as to rates of cooling the microscopic structures were in each case identical with those of the metal mixed in the orthodox manner. These results indicate that as regards white metals shop secrets, or mysteries of mixing, have only a fancy value, and that although some particular methods may have value as regards convenience, or even as to accuracy of the final product, they are not essential as regards the quality of the bearing metal.

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## CORRECTION.

The paper entitled "Making Manganese Bronze From the Standpoint of a Foundry Foreman," published in the November number of The Metal Industry, was by mistake reported to have been written by J. F. Webb. David C. Thompson, of Rock Island, Ill., was the author of the paper.

*Paper read before the Institute of Metals.

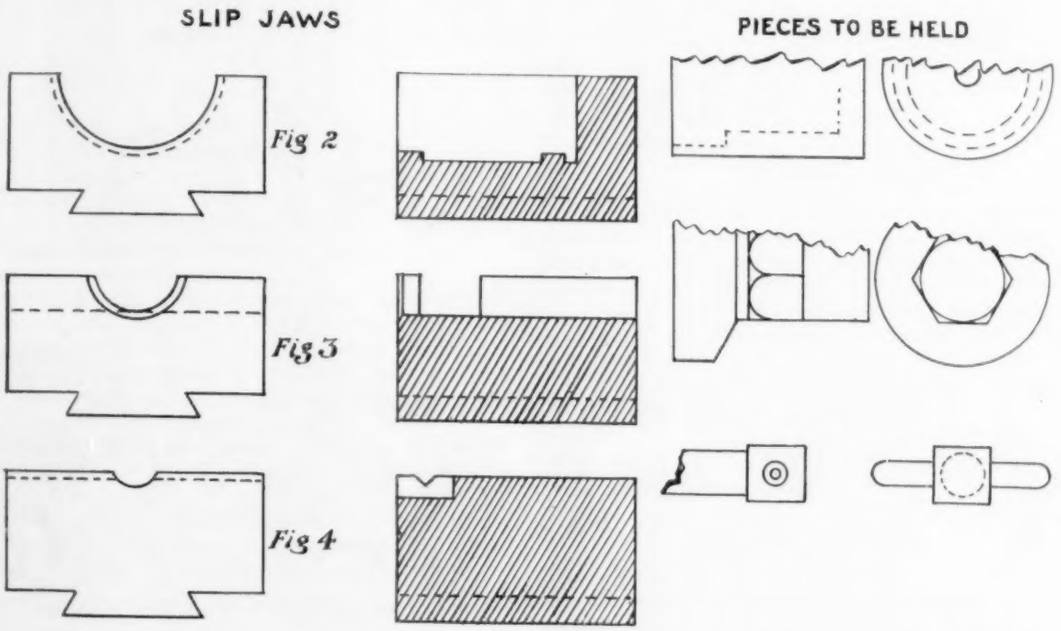
## THE TURRET LATHE AND ITS EQUIPMENT.

By Easy Way.

(Continued from October Number.)

Before taking up the tools that actually perform the work a little should be said about the pieces to be machined. In the design of pieces strict attention should be given to the method of holding them while being machined. By using judgment in this matter and the correct number and kind of tools a great saving is effected and better work obtained. Whenever castings are worked that are not finished all over some allowance has to be made for irregularities in shape and the difference in diameter of the tang that is held in the spring collet.

An illustration of this is shown in Fig. 1, where the




piece is held in the spring collet and the tools in the turret are worked to fixed stops so as to maintain a constant distance from the forming and cut-off tools in the cross slide. Three styles of jaws for two-jawed chucks are shown and the pieces to be machined on Figs. 2, 3 and 4.

Less irregularity is found in work produced in a two-jawed chuck, as it has no tendency to push the work toward the turret. Because of the irregularity in diameter of rough castings a manufacturing two-jawed chuck worked by a lever the same as a spring collet is now on the market and can be used to great advantage on a large variety of work.

We now come to the many styles of tools that are used in the turret. If these have been designed to perform their duty in the shortest possible time taking into consideration the cost of maintenance, such as grinding, repairs and setting, and they are of the required accuracy and quality, then the toolmaker has filled his part of the responsibility for good work at a minimum of cost, and it is the foreman's duty to see that results are produced worthy of the tools.

(To be Continued.)

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The production of antimony in the United States in 1907 from foreign and domestic ores amounted to 2,022 short tons valued at $622,046. During the same period the importations rose in value from $1,616,381 in 1906 to $1,686,802 in 1907.

## THE BRASS AND COPPER INTERESTS AT ROME, N. Y.

The large brass and copper interests situated at Rome, N. Y., appear to have been especially fortunate in having been able to maintain approximately normal conditions during the year of depression just passed. Practically all of the mills and factories have been running full time for some months, and at present a number of them have in some departments both day and night forces at work.

This district is steadily growing in importance as a brass and copper center, the latest development being the Spargo Bronze Wire Cloth Company, just organized with a capital of $50,000, by James A Spargo, of The James A. Spargo Wire Company, who will be president and general manager of the new enterprise. A steel-construction building 100 x 200 ft. will be erected close by the present mill of The James A. Spargo Wire Company. The new concern will confine its output to bronze wire cloth for use in mosquito and fly screens. Twenty positive motion looms for weaving the cloth have already been built, and twenty more will follow. The work of organizing and managing this company is entirely in the hands of James A. Spargo, who will continue, also, the active management of The James A. Spargo Wire Company, as at present. This latter concern is now running full time daily and three nights a week.

The Long-Turney Manufacturing Company has been reorganized as the Rome Turney Radiator Company, Rome, N. Y. This company is allied with the Rome Brass & Copper Company. Extensive improvements are being made, including a new concrete and mill construction building 51 x 200 ft. in size, two stories high. The radiators and condensers made by this concern are extensively used by automobile manufacturers, and new uses are continually being found for them, particularly in connection with search lights, gasoline railway cars, etc. The company reports more than enough orders on hand to keep the factory busy for several months, hence the increase in manufacturing facilities noted above. A large part of the new building will be devoted to the manufacture of radiators for the new self-propelling gasoline-electric passenger cars which the General Electric Company has been developing during the past two or three years, and to making

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The Rome Metal Company has about three hundred men at work and its volume of business is said to be increasing steadily.

The presidency of the Rome Brass & Copper Company, Rome, N. Y., made vacant by the death of Jonathan Haselton last June still remains unfilled. It is reported that a new president will be elected early in 1909, and that Barton Haselton, at present secretary and treasurer, will retain his present office, which carries with it the executive responsibility and active management of the company.

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## A NEW FURNACE.

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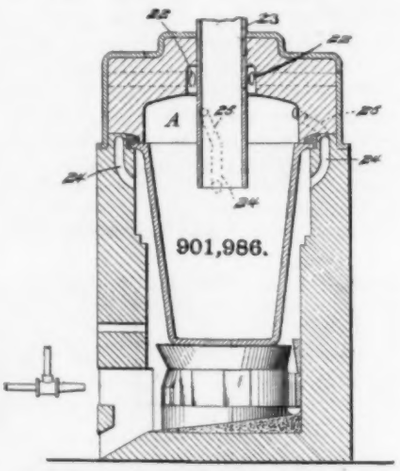
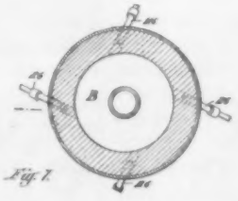
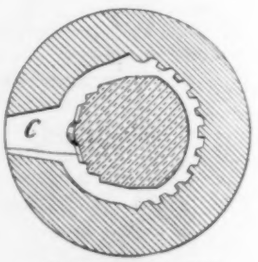
Moreover, owing to more or less perfect combustion there will be a layer of inert gases, consisting substantially if not entirely of $CO_2$ which have no deteriorating action on the metal, collected in the lower part of the cover chamber. Another form is to introduce separate burners through the cover, Fig. B, whereby the flame is directed against the roof and downward on the top of the crucible, making an even




FURNACE IN SECTION.



PLAN OF COVER.




PLAN OF BOTTOM.

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Another method of welding aluminum sheeting which shows promise of success, and which would repay further investigation, is the electric system of welding, by means of so-called spot welders; this method being extensively used for copper and iron sheet.

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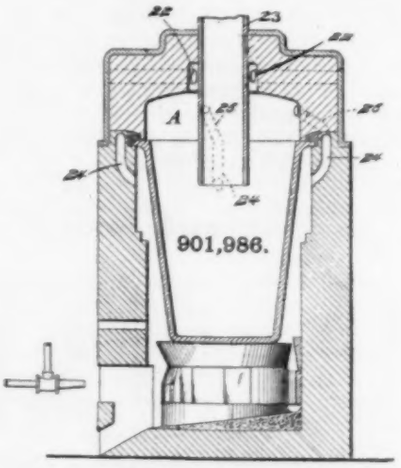


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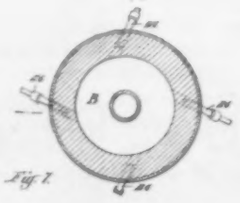


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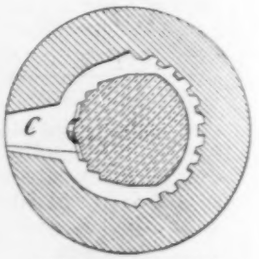


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In a series-parallel arrangement, two or more of the cells are connected in series, forming what is known as the series group; two or more of these groups are then connected together in parallel, according to the amount of current desired, Figure 3.

*Fig. 1 Series arrangement.*

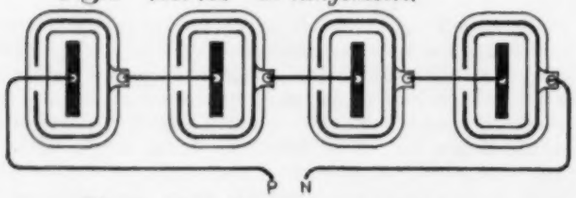
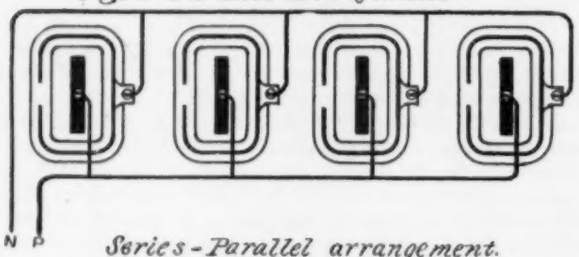
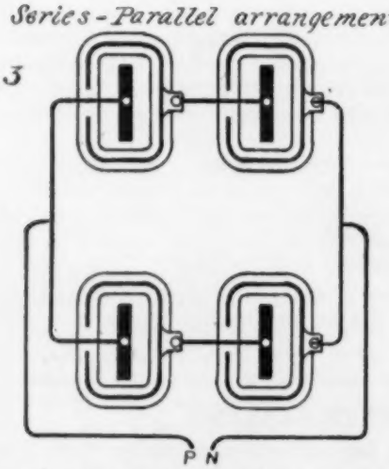



*Fig. 2 Parallel arrangement*




*Series-Parallel arrangement.*

*Fig. 3*




Assuming that each cell is equal to 1 volt × 1 ampere, the output could then be read as 1 volt × 1 ampere = 1 watt. The number of watts of a given number of cells remain the same and the gain in amperage is always at the expense of voltage, or vice versa, as for example: fifteen cells, having an output of 1 watt each, connected in the series-parallel arrangement, consisting of three series-groups of five cells each, each series-group would individually give 5 volts × 1 ampere.

The parallel arrangement of the three groups would give 3 amperes, the output of which would be written 5 volts × 3 amperes = 15 watts; were these cells connected, however, with but three cells in each series-group, and the five groups arranged in parallel, the output would be 3 volts (from series) × 5 amperes (in parallel) = 15 watts.

Were the full fifteen cells connected in series, the output would be 15 volts × 1 ampere, *i.e.*, 15 watts. In parallel, however, the fifteen cells would give 1 volt and 15 amperes, which would equal the same 15 watts. These explanations are for the Bunsen battery. With a storage battery where the output varies according to the size and build, from 30 ampere hours at a current strength of 2 volts to 60 ampere hours at a current strength of 5 volts, a little more figuring is necessary to arrange the cells so as to get the proper amperage at the required voltage.

For instance, if each storage battery gave 30 ampere hours at 2 volts and it was necessary to run at 4 volts pressure for two hours, at 15 amperes, it would require two cells connected in series, which would give 4 volts and 30 amperes for one hour or 15 amperes for two hours. Were 20 amperes required, at a current strength of 4 volts for thirty hours, it would require forty cells connected in series of two each—this would give twenty series-groups—These groups connected in parallel would have an output of 600 amperes for one hour, or 20 amperes for thirty hours at a current strength of 4 volts.

The writer wishes to call attention to one very important point in charging batteries—always disconnect the batteries before stopping the dynamo—Otherwise it will be found when starting the dynamo that the current has reversed, *i.e.*, the positive pole has become the negative and the negative pole the positive. When there is an excess of current from the dynamo, it is customary to use this in charging the batteries. This can be done while batches are plating from the dynamo.

Many large storage batteries are now made of but one cell, the output depending on the size and number of plates. The single large cell is much handier than a number of small ones.

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## MOULDING SANDS.

By Heinrich Ries, Ph.D.

(Concluded.)

*Permeability and porosity.* The permeability of a sand may be defined as the property which it possesses of allowing liquids or gases to filter through it. It depends therefor on the size of the pores. The porosity can be defined as the volume of pore space between the grains. These two properties are therefore different and should not be confused. Two sands might have exactly the same percentage of pore space, but differ in their permeability, and the latter would be greatest in the one containing the larger pores.

Again, a sand might have a large total pore space, but owing to the smallness of the pores its permeability for gases and liquids would be low. Of the two physical properties mentioned above the permeability is by far the more important, but so far as the writer is aware it is never tested, because to do so satisfactorily requires special apparatus. The foundryman sometimes attempts an approximate determination by taking some of the sand between his hands and blowing through it. In the laboratory it could be tested by determining the time required for a given volume of air, to pass through a given volume of sand, under a given pressure.

Such a test should, in the writer's opinion, be made on both the dry sand and also on the moist sand tamped at the same pressure as it would be in the mold.

The texture determination may give us some information regarding the permeability, as the finer grained a sand and the more clayey its character, the smaller its pores and the lower its permeability.

As an example of the relation between texture and permeability we may take the two following sands, whose analyses are given herewith:

| Size mesh. | Per cent. retained. | |
|---|---|---|
| 20 | .08 | .27 |
| 40 | .20 | .54 |
| 60 | .17 | 1.21 |
| 80 | — | .32 |
| 100 | .14 | 1.21 |
| 250 | 87.56 | 69.46 |
| Clay | 11.82 | 26.97 |
| Per cent. porosity | 45.90 | 38.70 |

No. I. is the more porous, and permeable of the two, and allows the gases to escape more readily. This higher porosity is shown above, and is influenced evidently by the lower clay content.

It is probably reasonable to assume that there is a general but not very close relation between the porosity, texture, and permeability, and we should be justified in stating that of two sands having the same texture, the one with the greater porosity is probably the more permeable of the two. The measurement of permeability is a somewhat difficult operation and requires special apparatus, but the determination of porosity is by no means hard to make, and gives us, when considered with the texture, an approximate gauge of the permeability of the sand.

*Life of foundry sands.* Practically all molding sands lose some of their desirable qualities after being exposed to the heat of the molten metal, and become "dead." A dead sand has had much or all of its cohesion destroyed, and its texture altered, as well as having changed slightly in its chemical composition.

In casting it is a layer next to the metal which is most affected, and the thickness of this layer depends on the size of the casting and temperature of the same. On removing the casting it is impracticable to separate all of this burned sand from the unburned and moreover there is no sharp line of division between the two, so much of it gets mixed up with the sand which did not become burned. Since, however, this dead sand has lost much of its bonding power, a small amount of fresh sand has to be added from time to time.

In order to consider a method of testing the life, one must consider what factors influence it. The deadness is no doubt due to several causes, such as dehydration of the clayish particles, resulting in the destruction of their plastic qualities, or the agglomeration of particles by fusion, thus increasing the coarseness and making it less plastic.

While a practical test is perhaps the best thus far known for determining the life of the sand, it seems as if the chemical analysis might give us a clue, assuming the loss in cohesiveness to be due partly or even largely to the dehydration of the clay. A clayey sand would show more chemically combined water than a silicious one. The degree of agglomeration that occurs on heating should also be observed.

In this connection the two sets of analyses given below are not without interest. No. I. is an unused molding sand from Richmond, Va. It is much used for general work in the local foundries and bears an excellent reputation. No. II. is some of the "dead" sand taken from the layer next to the metal.

Mechanical Analysis.

| Size mesh. | Per cent. retained. I. | II. |
|---|---|---|
| 20 | 1.51 | 5.34 |
| 40 | 1.26 | 14.73 |
| 60 | 1.27 | 10.41 |
| 80 | .56 | 1.28 |
| 100 | 6.27 | 14.61 |
| 250 | 71.69 | 59.37 |
| Clay | 16.52 | 3.52 |

Chemical Analysis.

| | I. | II |
|---|---|---|
| Silica | 83.49 | 82.32 |
| Alumina | 7.25 | 7.80 |
| Ferric oxide | 4.71 | 3.98 |
| Lime | .36 | .54 |
| Magnesia | .35 | .41 |
| Potash | 1.30 | 1.64 |
| Soda | .41 | .81 |
| Titanic oxide | .30 | .22 |
| Water | 1.66 | .19 |
| Ferrous oxide | — | 2.38 |
| Total | 99.86 | 100.28 |

Comparison of these two sets of analyses indicates that there is a decided increase in the coarseness of the dead sand, due to a fusing together of the particles. The chemical analysis shows little difference between the fresh and the used sand except in the case of the water which has been driven off, and there is also an increase in the iron, some having been absorbed from the metal. Much of it is moreover in the ferrous condition.

*Conclusions.* It seems to the writer that the evidence which has been given points somewhat forcibly to the fact that the chemical analysis is to be but little relied upon in judging the qualities of a molding sand, and that the physical tests are far more important.

In order to consider the question from as many standpoints as possible, we may inquire whether there is any relation between the chemical composition and the use to which the sand is to be put. Do brass sands, for example, show any chemical composition which distinguishes them from sands to be used for iron casting. I believe that here again the evidence is distinctly in the negative:

| | I. | II. | III. | IV. | V. | VI. | VII. |
|---|---|---|---|---|---|---|---|
| Silica | 71.60 | 86.80 | 57.63 | 79.36 | 79.81 | 81.50 | 82.21 |
| Alumina | 11.49 | 3.05 | 10.03 | 9.36 | 10.00 | 9.88 | 9.48 |
| Fer. Oxide | 7.81 | 5.32 | .88 | 3.18 | 4.44 | 3.14 | 4.25 |
| Lime | .65 | .15 | 11.16 | .44 | .70 | .65 | 1.04 |
| Magnesia | .95 | .65 | 5.63 | .27 | .88 | 1.04 | .32 |
| Potash | 1.42 | .83 | .. | 2.19 | .. | .. | .05 |
| Soda | 1.27 | .04 | .. | 1.54 | .. | .. | .09 |
| Titan Ox. | .. | .. | .. | .34 | .. | .. | .. |
| Loss on Ignition | 4.00 | 3.25 | 14.66 | 2.02 | 2.89 | 3.00 | 2.64 |
| Moisture | .. | .. | .. | .74 | .. | .. | .. |

*King, U. S. Geol. Surv. 19th Ann. Rept., pt. II, p. 209-215.

In the table given above Nos. I. and II. are both brass sands, but are quite dissimilar in their silica and alumina contents. No. III. is also classed as a brass sand, but bears no resemblance chemically to I. and II. Nos. IV. and V. are not dissimilar, and yet the former is a stove plate sand while the latter is used for making heavy castings. Of course there are cases where two sands used for the same class of work are of similar composition as Nos. VI. and VII.

To sum up, then, regarding the chemical analysis, it would seem to the writer that it gives us little or no information regarding the bonding power, texture, permeability or use of the sand, the only case in which it is of value being in the selection of a highly silicious sand for certain work, such as steel casting.

---

The production of copper in the Eastern States in 1907 amounted to 20,307,180 pounds valued at the average price for the year of 20 cents per pound at $4,061,436. This production was chiefly from the famous Ducktown mines of Tennessee, but Alabama, Georgia, Maryland, North Carolina, Vermont and Virginia all contributed, North Carolina and Vermont each producing over 500,000 pounds. The total production of the Eastern States showed an increase of 1,457,575 pounds over the previous year.

# INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

## THE MANUFACTURING CHUCK.

By Brass Worker.

There is perhaps no article of recent production for use in the manufacturing shop, and particularly in the brass manufacturing shop, that has attracted so much attention from the shop manager, superintendent or foreman, as the chuck referred to in this article.

For years this class of manufacturing work has been done on the old-fashioned two-jawed box chuck, dating back as far as memory will go, and the practice or use of this type of chuck has been carried down to the present day, where they are still to be found the standard in all of our best shops. This only goes to prove that there is a good deal of merit to be found in the original two-jawed screw chuck. Every brass finisher knows that, no matter how difficult or irregular the piece of work is, he can grip it securely and hold it firmly during the operating of machining. There are two disadvantages, however, connected with this style of chuck, namely, the key and screw. The natural result of the use, or, rather, the misuse, of the key, causes the jaws to gape at the outer end after a short time, disabling the chuck for accurate work.

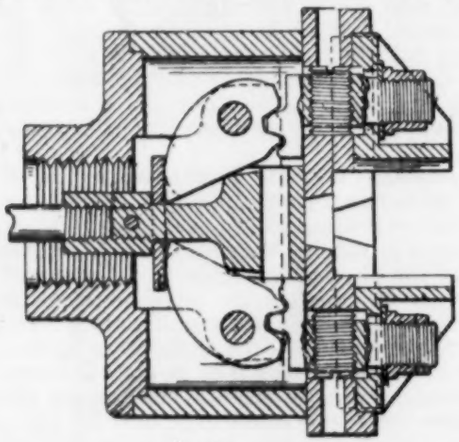


FIG. 1.
SECTIONAL VIEW OF CHUCK, SHOWING JAWS OPEN.

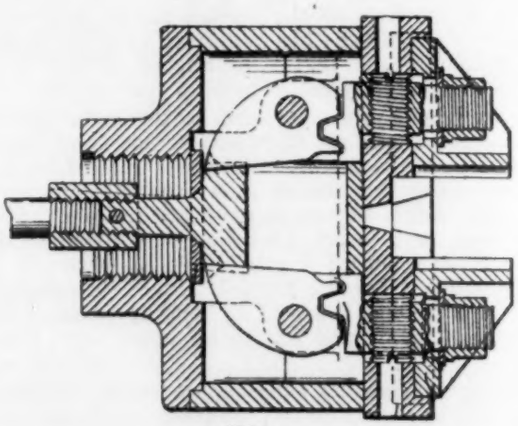


FIG. 2.
SECTIONAL VIEW OF CHUCK, SHOWING JAWS CLOSED.

The manufacturing chuck shown in Fig. 3 embodies all the good points of the old style box chuck, with the elimination of the screw and key, and its consequent accompanying evils. As will be seen from the cuts showing this article in detail, it is of the same general appearance and design as the old style chuck. It is round in form, so that it will not catch and throw the chips as they come from the piece. Perfectly balanced, and capable of revolving at high speed, this chuck is operated instantaneously by means of a lever, either to open or close, and the construction is such that when closed it is impossible for the piece to become loosened while being operated upon. Fig. 1 shows the internal construction and the chuck open. Fig. 2 shows the chuck closing and the draw rod expanding the levers which close the jaws.

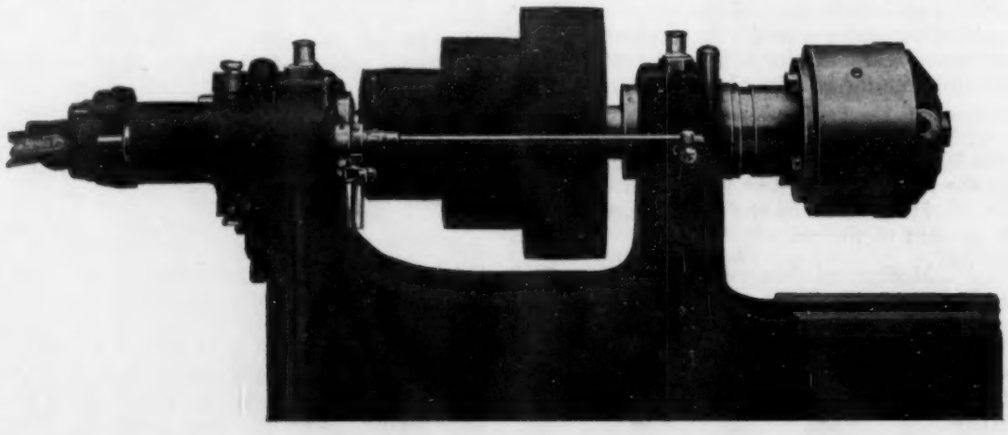


FIG. 3.
FRONT VIEW OF A MONITOR LATHE EQUIPPED WITH THE MANUFACTURING CHUCK AND AIR CYLINDER COMPLETE WITH HAND POWER LEVER.

Entirely opposite to all other types of construction, this design multiplies in power as the draw rod is pulled out, and, therefore, in place of the extreme pressure which is required to close all other types of chucks, including the collet and box chucks, a reversal of pressure is found; this one actually closing easier as the rod advances. It requires but a slight pull on the lever to hold the piece firmly while machining.

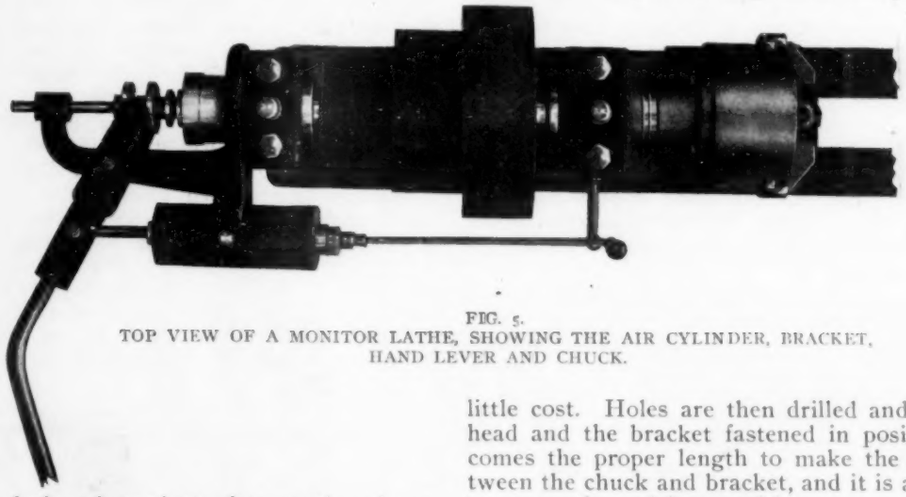


FIG. 5.
TOP VIEW OF A MONITOR LATHE, SHOWING THE AIR CYLINDER, BRACKET, HAND LEVER AND CHUCK.

The body is designed so that, after continued use, should there occur any looseness or gaping about the jaws, it may readily be taken up, thereby always insuring tight fitting jaws. As the levers are set above the centre of the chuck, it is possible to bore a hole clear through, using a tube for operating the jaws. A ⅞-inch rod will pass through the No. 1 chuck and a 2-inch rod through the No. 2.

For rod work this chuck is unequalled, because it has unlimited range in the jaws and because the jaws open and close parallel to each other, something not done by any other style of quick-opening chuck. The master jaws are detachable, and any style of jaw may be fastened in their place, doing away entirely, if necessary, with the slip jaws which are commonly used.

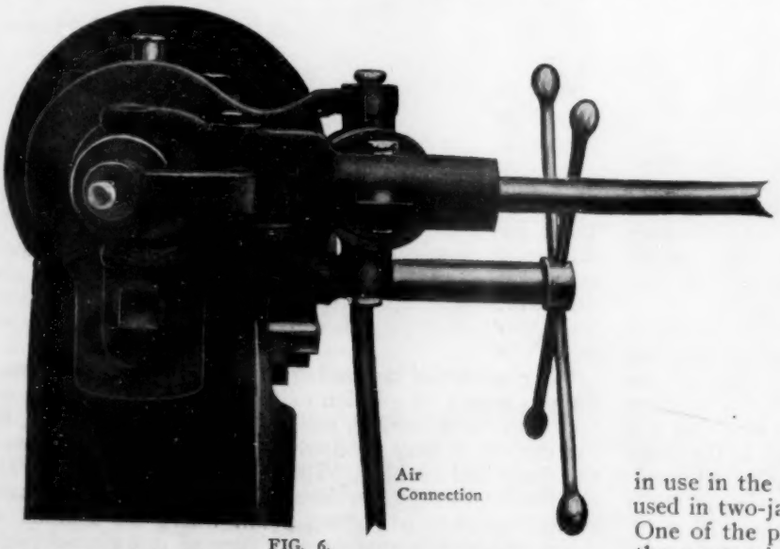



FIG. 6.
END VIEW, SHOWING METHOD OF MAKING REAR CONNECTION.

The chuck is attached to the lathe by means of a face plate which is furnished with the outfit, and the rear connection is made by means of a bracket screwed to the head, as shown in Fig. 6. The bracket is furnished bored to a diameter of 4 inches to fit over the flange of the bearing. In adjusting to the lathe it is necessary to make a ring, the outside diameter of which is 4 inches, the inside diameter fitting the round part of the box snugly. This method brings the bracket in perfect alignment easily and surely at little cost. Holes are then drilled and tapped in the head and the bracket fastened in position. The rod comes the proper length to make the connection between the chuck and bracket, and it is a simple matter to screw the rod into position.

A plate, Fig. 9, is also furnished for use on the tool lathe when boring or making extra slip jaws. The master jaws are removed from the chuck, or an extra pair of master jaws can be purchased for this purpose, so that the chuck may not be delayed while new slips are being prepared. Master jaws are furnished in two lengths, the standard being 1⅞ inches, while the longest extend 3¼ inches from the face of the chuck. Any style of dovetail or parallel with screw fastening for the slips may be had to fit the standard already in use in the different shops. Therefore any slips now used in two-jawed box chucks need not be thrown away. One of the patented features of the chuck pertains to the master jaws which have an adjustment of ⅛ inch each, so that slips which do not run true may easily be centered, or a pattern which is not absolutely true in itself may be made to run true. The construction of the chuck permits no chips to enter the working parts, insuring long life to the whole device.

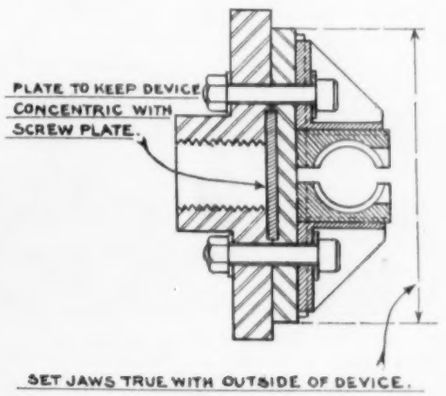
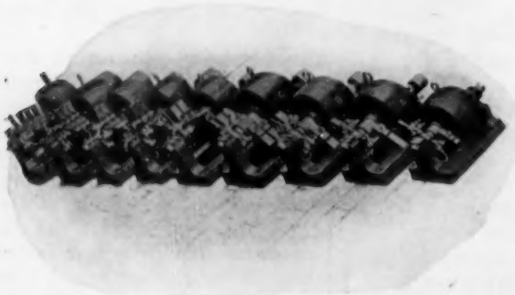



FIG. 9.
PLATE USED ON TOOL LATHE FOR MAKING EXTRA JAWS.

An air cylinder is furnished when wanted, and is attached to the bracket, as shown in Fig. 5, which cut

shows a full top view of the device on the lathe. This device in no way interferes with the operation of the chuck by the hand lever, which insures constant operation of the lathe, and prevents the possibility of being delayed or being dependent entirely upon the continuance of the air supply. All other styles of air or spring chucks are attached directly to the spindle of the lathe and prevents the lathe from being used if anything should go wrong with the operating means. The air cylinder is complete in itself, having the operating valves within its casing, with nothing but a rod projecting, to which is attached the handle. A slight movement of the handle in either direction operates the chuck instantly and positively; the air being exhausted as soon as the operator removes his hand from the handle. No air is used while the chuck is in motion, the levers in the chuck holding the piece firmly, as in the case of the hand operated device. thereby doing away with all unnecessary piping Only one air connection is made, as shown in Fig. 6, around the machine.

There are no springs whatever in the chuck, as will be seen by reference to the cuts, each part being mechanically controlled by the rod. This insures prompt and positive action to the jaws. It is absolutely necessary that chucks have an adjustment to each jaw as it is impossible to have all castings come the same diameter and to be gripped alike. As stated



A ROW OF DYNAMOS.

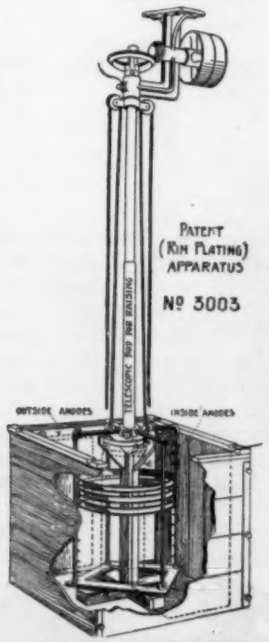
above, the jaws operate parallel to each other, the same as any two-jawed chuck, and for this reason they must have vertical adjustment. Devices using the inclined plane or cone to operate the jaws do not need adjustment, but have the disadvantage of drawing the casting inward, and away from the fixed stops on the machine, thus producing variations in the length or depth of the pieces being finished. No such thing can occur with this new chuck. The socket wrench furnished for use on the master jaws is also used for making the required adjustment.

The No. 1 chuck is 7 inches in diameter and takes in a piece 2 inches in diameter, the jaws opening 3¼ inches, allowing ample freedom while placing the work. The No. 2 is 9 inches in diameter and takes in a piece 4 inches in diameter, the jaws opening 5¼ inches to remove the piece. A stop placed in the draw rod limits the scope of the jaws to any desired opening within their capacity. The whole device is made in the most workmanlike manner from jigs; all movable parts being made from steel and, where necessary, hardened and ground. The outfits are sent to responsible concerns on a thirty-day trial with an absolute guarantee as to its efficiency. The chuck is used by a number of the leading brass manufacturers and by them is highly recommended. It is being placed on the market by W. L. Abate, 76 West Lincoln avenue, Mount Vernon, N. Y.

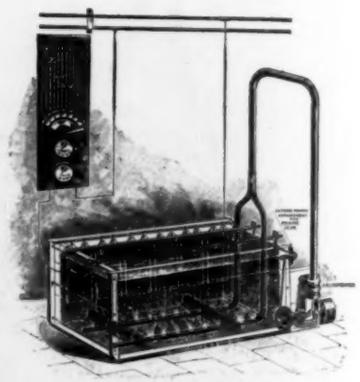
### BIRMINGHAM PLATING APPARATUS.

W. Canning & Co., of Birmingham, England, are one of the oldest manufacturers of electroplating and polishing supplies, and we herewith illustrate a few of their specialties. They make a large range of low voltage dynamos for electro deposition and metal extraction, up to 3,000 amperes, which are running in different parts of the world. The firm are engaged in the manufacture of apparatus for depositing all kinds of metal, and have introduced several devices for rapid and heavy depositing. One of these is the Patent Pneumatic Agitator shown in cut, which is being extensively used for general electroplating, and for which the makers have received numerous testimonials from firms who have this agitator in use, including cycle makers, harness makers, motor car manufacturers, printers and electrotypers. The advantages of agitated solutions is described as follows:

"It has been proved by actual experience that in a nickel-plating vat, taking a current of 50 amperes, with a still solution, the current may be safely increased to




PATENT RIM PLATING APPARATUS.



PATENT PNEUMATIC AGITATOR.

about 150 amperes, if the same solution be properly agitated, and a movement be given to the *Cathode* rods. It follows, therefore, that in an agitated solution, an equal amount of deposit may be obtained, in one-third of the time which is necessary when a still solution is used, and less plant is required for turning out a given quantity of work.

"The system of circulating the electrolyte brings a continuous supply of solution of full metallic content in contact with the *Electrode*, and as there is less resistance of the current it may be used in greater quantity without the danger of burning. The air compressor of our Patent Penumatic Agitator forces the solution down the agitating chamber to a given point, where the solution is released and immediately gravitates to its original position in the chamber, where it is again forced through the perforations in the agitating chambers. The Cathode rods are moved forwards and backwards along the top of the vat. In cases where the agitators are required in several vats, *one* air compressor may be used to actuate the whole.

"An important factor in the successful working of

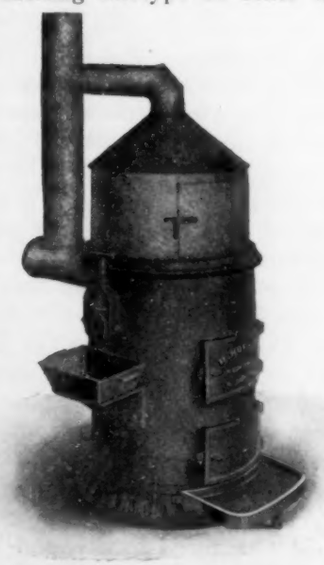
this system is that the leads conveying the current to the vats, also the connections, and the rods on which the anodes and Cathodes are suspended, should be of ample area to carry the increased amount of current required.

"The resistance board must also be of substantial construction and the area of contacts large enough for the heavier current demanded."

The Patent Rim Plating Apparatus, shown in cut, is made solely by W. Canning & Co., and has many advantages in the rapid deposition of nickel on cycle rims. The principal is that the cage which holds the rims is revolved by a suitable shaft, around the anodes which are placed on a stand in the center of the rims, thereby depositing the metal on that portion of the rim which is desired. A good average current is 10 amperes per rim. If a cage holding 12 rims a current of 120 amperes would be required. The cage is easily raised and lowered into the desired position by means of a telescopic tube and rope and is self-contained. A stand is fixed in the vat inside the apparatus from which curved anodes are suspended, a suitable cable insulated to prevent the copper coming in contact with the solution. When ordering an apparatus it is necessary to give the exact measurements from the top of the vat to the roof or timber on which the carrier is fixed. A fast and loose pulley is provided.

### NEW DROSS REFINING FURNACE.

R. Hoe & Co., 504 Grand street, New York City, whose name is famous throughout the world as manufacturers of printing presses, have just perfected the dross refining furnace shown in cut and which is also adapted for melting linotype or other white metals.



HOE DROSS REFINING FURNACE.

The body of the furnace is made of boiler iron and lined with fire brick. The spout, which projects through the side of the furnace, is cast onto the pot and the channel in the spout has sufficient pitch that the molten metal will run into the pan resting upon the shaft. Two of these pans are supplied with each furnace. On the spout there is a hinged yoke and cap. When the cap is screwed against the mouth of this spout, the pot can be used for melting linotype or other white metal. It has a capacity of 225 pounds.

The furnace is 29 inches high and 24 inches in diameter at the base. A galvanized sheet iron hood and pipe is supplied with each furnace. It is 10 inches high on the vertical sides and 17½ inches high where the piping joins the conical top. The door in the hood is 11 inches wide. The fuel can be either coal or gas. The price of the furnace is $100, less 25%.

### NEW POLISHING FRAME.

The New Britain Machine Company, 200 Chestnut street, New Britain, Conn., have brought out recently a new polishing frame or stand which is different in some features from others which have been offered. Where preference exists for a polishing frame with cone point arbor running in maple blocks, the advanced design shown in cut is suitable.

The curving forward of the frame toward the workman brings the wheel where it will polish tubes, cylinders, hollow ware, or irregular shapes without the interference which arises where a straight frame is used. The weight and strength of the frame is ample to resist vibration. Holes accurately bored and aligned take the wooden blocks and the adjustment of these blocks is conveniently set by screws which

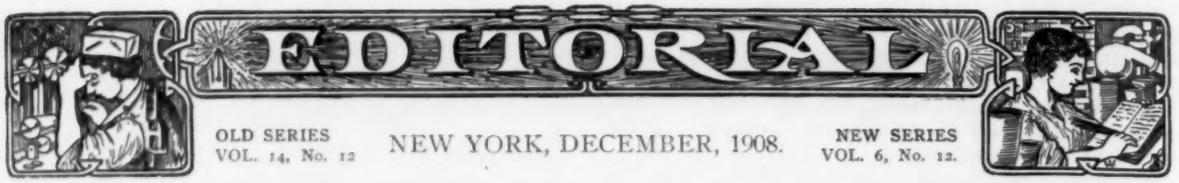
NEW POLISHING FRAME.

do not bind directly on the block. Each of these screws is provided with a drop forged binder handle. These handles, unlike a wrench, are always there when needed, may be swung back when not in use, and are out of the way when polishing long pieces.

The base, while affording a generous bearing, is formed to offer little of an obstruction on the floor, or when sweeping about. Arbors to suit any requirements furnished at low prices. Belt may lead from overhead or from rear counter as desired.

Specifications are as follows:

Height to centre of spindle, 32 inches; 81 cm.
Weight in shipping order, 250 pounds; 114 kg.
Length of arbor used, about 12 inches; 30 cm.

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## CONTENTS



### INSTITUTE OF METALS.

In this number we featurize the first convention of the Institute of Metals, the British society which is to be in the world of metals what the Iron and Steel Institute is in the world of iron and steel. The Institute likewise occupies the same position in the United Kingdom that the American Brass Founders' Association does in the United States. The primary object of each society is to promote the educational welfare of the metal industry. We believe, therefore, that all members of the American Association will be interested in the progress of the British Institute and even those who are not members of the Association can read with a great deal of instruction the papers presented before the Institute as they contain the latest and best British practice, and in certain of the arts relating to metals, the British practice is the best practice the world over.

In examining all of the circular matter which related to the first convention of the Institute we are impressed with the thoroughness with which the convention was managed so far as this can be determined by the printed arrangements. Apparently not a detail was overlooked and when a member arrived at the headquarters and received all of his printed instructions he knew exactly how and where to go to all of the meetings and visitations and just how he would be taken care of while at the general meeting. The programme was also arranged with sufficient variety both in the papers, visitations and entertainments that would hold the attention of everyone.

The Institute of Metals expects to meet ultimately in the United States following the example of the Iron and Steel Institute which journeyed to this country a few years ago. At present the Institute is holding its meetings in the different cities of Great Britain. It also desires American members and as the spirit of the society is international, it will no doubt appeal to American metal men. We congratulate the Institute on its successful first meeting, wish it every success in its career as an industrial educational society, and hope that the American Brass Founders' Association may follow examples of the Institute's progress whenever it leads in society affairs, and that the Institute may find a few suggestions from the American Association.

### RELIABLE METALLURGICAL BOOKS IN 1683.

In this age of progress when the slogan of every manufacturing establishment is modern practice, it is interesting to note that in the year 1683 there were some authors at least who were able to write and tell others of the best metallurgical practice of that day. During the past month we have had the pleasure of examining a

large leather bound book entitled "The Laws of Art and Nature in Knowing, Judging, Assaying, Tinning, Refining, Inlarging the Bodies of Confined Metals." By Sir John Pettus, of Suffolk, Kt., England. The "oars" and metals treated are gold, silver, copper, lead, tin-stone, iron-stone, salt petre "boyling." The book is remarkable in showing that the principles of metallurgy and the working of metals were pretty well understood in that day and all who have seen the work are astonished at the technical and useful information contained therein, many of the principles that are noted being applicable to present day practice. The book contains 345 pages with many illustrations and is well printed on paper that has defied the ravages of time. It also contains a second part on "Essays on Metallick Words" alphabetically composed "as a dictionary." This part has 133 pages. The work has been the property of Frederick Woodruff, of Newark, N. J., for twenty-five years, and he prizes the book so highly that it is kept in a safe. We wonder what many of the technical books of the present generation will look like 225 years from now.

### NICKEL ANODES.

In our last issue we called attention to the discussion going on in the "Criticism and Comment" page of THE METAL INDUSTRY relating to the cleaning and not cleaning of nickel anodes and we stated then that the end of this discussion was not in sight. That we prophesied right is evidenced by the several letters pro and con published in this issue and which no doubt will throw additional light on the subject. Each side which has taken part in this discussion, those who believe in the constant cleaning of the anodes and those who do not, have presented their beliefs with great earnestness and in passing we wish to say that the participants in this discussion have been the leaders in the plating industry. The platers in question being in charge of the largest plating plants of the country and are men who have made the subject of plating a study for years. The discussion shows how there are several ways of looking at a question and of solving a problem and we believe that the plating fraternity of the United States has read the various comments with the most satisfying interest.


### THE MANUFACTURE OF TUBES.

To the Editor of THE METAL INDUSTRY:

In your October issue you say, under the heading of Ferdinand Deming and his work, "it was while at Randolph & Clowes that Mr. Deming developed the tube business of that concern, drawing seamless brass tubes, shown in the engraving," and "while there he also drew torpedo tubes, conical shape and 15 feet long."

Now, without any disparagement to Mr. Deming's ability, for I consider him, if not the most capable mechanic in the brass business, fully the peer of any one in the Naugatuck Valley in that line, yet, as managing partner of Randolph & Clowes during its whole existence as a firm, and the organizer and first general manager and treasurer of the Randolph-Clowes Company, and the one who took the old bankrupt concern of Brown & Brothers Corporation when under its last management it was run at a loss of $120,000 the last year of its existence, with all its old mills dilapidated and worn out, with its heritage of bad management, single-handed made the concern one of the leading brass and copper plants in the country, I deem it in justice to myself to state that the conical-shaped torpedo tubes, 14 inches inside diameter, 6 feet 8 inches long, 3-16 inches thick, weighing 200 pounds each, were drawn under my supervision and before Mr. Deming was connected with Randolph & Clowes, and which achievement at that time excited world-wide comment.

Three years after I bought out the tube and boiler business of the defunct corporation of Brown & Brothers (which corporation for many years stood at the head of the brass and copper business of the whole country), I bought out the old Rolling Mill property, which stood in the very centre of the manufacturing district of Waterbury and immediately opposite the principal railroad depot in the city, and reconstructed it into what was then described in the technical press as an up-to-date brass, copper and tube plant.

At this time all the machinery that was left in the old rolling mill was two pairs of rolls, dismantled; a 600 h. p. walking beam engine that was installed about 1867, and which consumed from ten to twelve pounds of coal to the h. p.; a small 125 h. p. horizontal engine, and a few dilapidated muffles, almost useless, and buildings that were nearly ready to tumble down.

All the principal machinery for the first-class brass and copper rolling mills, which were afterward erected, such as engines, boilers, rolls, etc., had been contracted for by myself before Mr. Deming was employed by me as master mechanic of the rolling mills, but subsequently he certainly was a valuable man in carrying out my instructions and wishes.

It was not until some time after this that Mr. Deming's abilities were called into service in connection with the Seamless Tube Plant and not until after the seamless tube business of the firm had been established as a leading one in its line in the country. Mr. Deming was a valuable man in the business, and in carrying out my ideas and wishes he was certainly successful to a marked degree.

I think I may be allowed to express my opinion, that the men who are at the head of our leading industries in the brass and copper line in the Naugatuck Valley, have been very short-sighted to the interests of this section of the country to allow Mr. Deming, as well as Mr. Morse—who is and has been the active man of the new mill at Hastings-on-the-Hudson—to be at large to help establish other industries outside of the Naugatuck Valley.

In closing, I would say as I have given Mr. Deming several letters of recommendation in the past, I think I may be permitted to quote a paragraph in one of his letters to me dated November 1, 1905, and which is as follows, viz.:

"I want to see you in business again, making tubes; a field in which you accomplished more than any living man."

GEORGE H. CLOWES.

Waterbury, Conn., October 26, 1908.

### NOT CLEANING NICKEL ANODES.

To the Editor of THE METAL INDUSTRY:

Again I must request the privilege of answering the criticisms which appear in your November issue, assuring you that if it were not for the doubt expressed in them and the questioning the reliability of the tests which I reported I would certainly have let the matter drop; but with your permission I will add a final word to the articles already published on the subject of cleaning anodes.

Your correspondent has broadly questioned the correctness of my figures, without in a single instance endeavoring to substantiate them, and while condemning all who have agreed with me for not "basing their opinions on facts or plausible theories." He proceeds to make, what he may think, a possible (but which is not), comparison between—my solution standing at 13° B and his at 5° B. My solution with 5 volts and his less than 3 volts. My solution at 130° F. and his at 70° F.

His current running for one hour and mine for 3¼ minutes and without an attempt to duplicate any of the conditions under which my results were obtained he claims his test of interest saying, "Every one knows how much more readily nickel deposits on brass than on iron. What wonderful results we find by glancing at his figures, I will endeavor briefly to point out: He claims a deposit of .0169 grains per sq. inch was obtained in one hour with 1½ amperes in a regular nickel solution. This must be a joke, or else it is a grave error, and one which no plater should make, for we all know that nickel is deposited at about the rate of .004641 grains per ampere second, or at the rate of 16.756 grains per ampere hour on .1 square foot of surface, so that with 1½ amperes the deposit on a square inch should have been about .1778 grains and yet in the very next paragraph he asks for arguments based on facts, and it will take many volumes of "facts or plausible theories" for him to convince the platers of this country or even their assistants that he is not unquestionably wrong and that such misleading statements are a great hindrance to those who read these pages, believing that those who write can be relied upon to be at least posted in the rudiments of the subjects they undertake to discuss.

Mr. Editor, that you and the readers of your paper may know that my test was correct, although your correspondent "can hardly believe I was serious," and assuring you of my earnestness in this matter I would respectfully state.

The operation that I stated in my third test and the results obtained are the regular methods employed in the Edison Storage Battery Company of West Orange for plating the steel ribbon from which the cells are made, and is now being done in the same way. I was employed there four years ago, and the device which I used then is in daily operation, the drawings of which have been published in your paper among New Patents. I need scarcely add that they have an accurate method of using the micrometer, both before and after plating, and these facts can be substantiated by anybody, and I trust will be before they rush into print to exploit their ignorance. Regarding the deposit I should have said it is beautifully lustrous and white and tenacious enough to stand annealing.

The deposit obtained from my second test is not bright, but is largely used and applicable on certain patented lines of work, while my first was the ordinary nickel deposit, only of longer duration, and required buffing to bring up the color as all deposits do that are run for that length of time.

I was sure of my ground when I made public this test, but not more so than when I affirm that the plater who uses a wire brush on his nickel anodes removes all the nickel which was loose and is most easily deposited. He has to loosen up that surface again before he can deposit as much nickel as when soft, and how much more trouble will he encounter if he attempts to reclaim his scrubbings as a sulphate as he is told he can "readily" do; I will guarantee that the resulting salts will be the most expensive and unsatisfactory he has ever used, and the experiment prove as impracticable as the suggestion of emptying large nickel solutions into "a convenient tank by means of a foot pump, filling with water and returning through felt filters." If anybody deems this practicable and up to date he should try it on a 1,100 gal. solution if he can find a "convenient tank to hold the solution," and then decide if the usual way of removing the dirt with a board properly worked is not one-fourth of the trouble and quite as efficient. While I never have and do not advocate dirty solutions, neither will I stand for unnecessary labor.

In closing my side of this discussion, which I regret has often deviated from the original question I cannot resist making one more reference to the writer who states: "The theory and application of properly proportioning rolled and cast anodes is so up to date as not to have become well known in this country."

What can the platers of America answer to this sweeping accusation; is it true? Have our brothers on the other side of the pond gone ahead while we who taught them their A B Cs in the art of nickel deposition been left behind? Have we the followers of Mr. Adams, of Boston, to whom they paid a royalty in 1870 when he discovered nickel could be plated in a double sulphate of nickel and ammonia solution, been asleep? Have they, I ask, succeeded where Dr. Langbein failed? or are they just plodding along in the old rut that we worked in years ago?

Is it the voice of a prophet or a call of the Wild?

B. W. GILCHRIST.

Woodhaven, November 21, 1908.

### NOT CLEANING NICKEL ANODES.

To the Editor of THE METAL INDUSTRY:

I am taking much interest in the discussion going on in your columns in regards to cleaning nickel anodes. I have often wondered why the subject was never brought up years ago. From my experience I have never cleaned a nickel anode except to brush lightly the yellow substance that forms on them, but I have never scraped off that black substance which a good many call carbon. I have never scraped our anodes since the day we put them in two years ago, and I might also add that I have not added a drop of ammonia since then. Our deposit is silver white, nice and soft and can be bent without peeling off. If any plater will take the trouble to break off a piece of that soft, black substance (called carbon, which it is not), dry it and then hold a magnet over the powder, he will find that it is magnetic, showing that they are finely divided nickel particles and the best part of the anode. If any plater scrapes off this spongy nickel he is only wasting his anodes. No doubt you get more current when the anodes are scraped, but there is a loss of nickel.

FRANK DUFFY.

Brooklyn, November 3, 1908.

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Canada is the best market for American jewelry, taking $836,852 worth in 1907, compared with $611,240 worth in 1903, and $378,231 worth of all other manufactures of gold and silver in 1907, against $173,182 worth in 1903.

### NOT CLEANING NICKEL ANODES.

To the Editor of THE METAL INDUSTRY:

I again beg leave to submit a few remarks on the advisability of not cleaning nickel anodes for general work, and I am quite sure that a large number of platers will support Mr. Gilchrist in his contention. We are pleased to note that Mr. Brown has receded from his former contention of cleaning anodes twice a week and filtering solutions twice a month, and concedes that cleaning anodes once every two weeks and filtering solutions once every two months is sufficient. May we not have hopes of converting him to still longer periods between filtering solutions and cleaning anodes?

We also note that Mr. Brown in his last article sagely remarks a plater may clean his anodes one at a time while the tank is plating. Shades of Roseleur and Watt! Fine practice this! And he an expert, forsooth! The veriest tyro in plating knows that if this practice were followed it would result in a rough and dirty deposit and possibly blistering, caused by the loose dirt falling from the anodes when removing and returning them to the bath.

We also maintain that the practice of proportioning rolled and cast nickel anodes is well known in this country, and has not been followed because no direct benefits have been obtained from such practice. Mr. Wharton some twenty-five years ago obtained a patent on rolled anodes, but failed utterly in bringing the rolled sheets into general use. We would also like some enlightenment on what Mr. Brown calls "corroding salts" which he adds to the electrolyte to ensure a rapid "corrosion" of the anode. We are unable to obtain any information in regard to "corroding salts" and we are not aware of any plater who uses them. Verily, Mr. Brown's notions on plating are unique, interesting and singular.

In conclusion we maintain that for general work it is unnecessary and unsuitable to scrape or brush anodes, and filtering is necessary only at long intervals. Insoluable materials will invariably settle to the bottom while greasy and light particles of matter will float on top and may be readily skimmed off every morning. The body of the solution is fairly clean under all conditions. It only becomes necessary to filter at very long intervals, or when hooks and wires are in danger of touching the sediment.

It may be necessary in rare cases—when the solution is agitated by air—to keep anodes and solutions scrupulously clean. This applies also in plating delicate instruments and watches, where it even becomes necessary to use an anode bag to keep the anode mud from contaminating the bath. But for ordinary work, including hardware of all descriptions, it is an unnecessary waste of metal to scrape and brush anodes and also a case of "Love's Labor Lost."

EMANUEL BLASSETT, JR.

Southington, Conn., November 17, 1908.

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### MAKING METALLIC FOIL ELECTROLYTICALLY.

To the Editor of THE METAL INDUSTRY:

My attention has been called to a note in your issue of last August headed "Making Metallic Foil Electrolytically." Such a process has been employed by me for a number of years for making metallic foil, namely, depositing the desired metal on a revolving mandrel so as to obtain thin foil, or, on a revolving drum so as to produce metallic foil, continuously. I have also made the anode a cathode for short periods so as to facilitate stripping, and deposited one sheet on another and then separated them like the leaves of a book, having previously oxidized or prepared the surface each time; this process was patented by me in the year 1899.

SHERARD COWPER-COLES.

London, November 14, 1908.

### NICKEL ANODES—PRO AND CON.

To the Editor of THE METAL INDUSTRY:

I have read with interest the articles in your trade journal, both pro and con, on the cleaning of nickel anodes. I appreciate the enthusiasm of both sides, and their ideas on the question. But neither side is hewing close to the line, so far as the actual conditions, and I thought I might help explain matters a trifle and get the questions focused to the right point of discussion. Each man's views seem to be from his own standpoint of work. I once read an article on how two learned professors argued for hours on whether liquor could penetrate the vein tissue. One claimed it was possible; the other, not. But when a third professor asked each to define liquor, one cited alcohol, the other water. So both were right and wrong. So it is with our anode cleaning contestants. If an anode is dirty and a solution is fitted to it, that solution will be O. K. for that anode and no good for clean anodes; the opposite is also true of a clean anode. The size of the anode also has its influence. Further, I will say a solution with dirty anodes will not do for certain classes of work. It can be used, but one with clean anodes is much more suitable. On the other hand, a solution with clean anodes is not necessary for certain kinds of work, especially so where speed alone is desired. Also a solution with dirty anodes up to a given point is much easier to handle than with clean anodes. There are many more things to consider. But draw your conclusions from these cases and get together on the facts, then the arguments will be educational to all of us. Remember: a quick plate in all solutions is like unto a forced crystallization in chemistry, granular, and not cohesive; a slow plate is the opposite. Dirty anodes also distribute through the solution small floating particles of itself; and viewed through a microscope the plating *from dirty anodes*, or, *quick deposits*, look like a rocky road in contrast to an asphalt pavement. I am an experimental plater of twenty-five years, but I would like pointers. In summarizing let me state: first tell what class of work you refer to; what size tanks, anodes and current capacity used; also solutions and size of work plated, as well as the compositions chemically of your solution ingredients; in fact all data, then results, and you will find both contestants have good and sufficient cause to claim his mode superior on his particular class of work and conditions thereto. An anode should hang hours in a nickel solution before the solution will accustom itself to it. Every new addition to any solutions sickens it, as it is called, and the more important the change the more marked its sickness. Quick deposits can be accomplished with either dirty or clean anodes up to a certain limit, and the difference between the two are infinitesimal. But a scientific deposit, in a crystalline sense, is accomplished by an anode that has been in a solution in use for 48 hours at least. This is a cleaned anode. Also let the contestants say what constitutes a dirty and a clean anode. Some call a week's use dirty, others a year's use. Let us be concise and understand each other, then the subject can be threshed out intelligently to all concerned. And remember all processes have good in them when they are used properly.

J. ANDERSON.

Gardner, Mass., November 11, 1908.

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A bell made in 1518 by Gerd von Von and now in the Altona (Germany) museum, has been found to contain 3 parts copper, 1 tin and traces of arsenic and antimony.


# CORRESPONDENCE


IN THIS DEPARTMENT WE WILL ANSWER QUESTIONS RELATING TO THE NON-FERROUS METALS AND ALLOYS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

## METALLURGICAL.

Q.—Please give me the formula or formulæ commonly used for car brasses.

A.—The best alloy that can be used for car brasses is what is known as S. Phosphor Bronze. The mixture for this is as follows.

| | |
|---|---|
| Copper | 78 |
| Lead | 11 |
| Tin | 10 |
| Phosphorus | 1 |

A typical cheap mixture is the following:

| | |
|---|---|
| Copper | 50 |
| Tin | 4 |
| Zinc | 10 |
| Lead | 6 |
| Red scrap, hard | 30 |
| Yellow scrap | 25 |

Half a stick of phosphorus is thrown into the metal before pouring.—J. L. J.

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Q.—What is the best method to use in making manganese copper containing 30 per cent. manganese?

A.—If the manganese copper is intended for use in managese bronze or similar alloys that are poured into sand castings it may be made from 80 per cent. ferro-manganese and any good brand of casting copper. The ferro-manganese and copper are melted in separate crucibles and the former poured into the latter and stirred vigorously. A melting loss of about 15 per cent. may be calculated on for the ferro-manganese. Manganese copper intended for use in alloys that are to be rolled should be as free from iron as possible and is best made by melting down copper with a good grade of metallic manganese. Alloys intended for rolling are hardened and rendered liable to crack if they contain much iron.—J. L. J.

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Q.—Please give us your ideas as to what is the best flux or other material to use in melting brass in order to secure good clean castings without pin holes, sand holes or flaws from dirt.

A.—It is better to rely on the use of good clean metal and careful melting to produce first-class castings than to try to doctor up dirty scrap, improperly melted, by using manganese, phosphorus or other deoxidizers. These have their use in special alloys, but are not needed in ordinary brass mixtures. Where it is necessary to use scrap brass or where much gates or remelt has to be used as is the case in making light castings, no better flux can be had than common salt. With oil melting furnaces, 1 part of fluor-spar to 3 parts of lime forms a good cover to protect the metal from oxidation.—J. L. J.

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Q.—In making manganese bronze I find I can get the right tensile strength, elongation and elasticity in the original ingot, but in remelting and pouring into a sand casting, invariably I lose slightly in tensile strength and elasticity but greatly in elongation. I use the best grade of materials. Can you advise me how to maintain the strength and elongation, or how to increase the ductility and maintain the strength? The ingot runs 90,000 pounds tensile strength and 25 per cent. elongation.

A.—A manganese bronze that shows 90,000 pounds tensile strength in the ingot is too hard for commercial work. You should adjust your mixture so as to get about 75,000 pounds tensile strength in the ingot. This should give about 68,000 pounds in a casting and about 40 per cent. elongation when new metal alone is used. Remelting manganese bronze always lowers its ductility and the common method of obviating this is to use two-thirds new ingot and one-third scrap.—J. L. J.

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Q.—I am having trouble in cleaning iron articles that are to be brass plated. Will you kindly give me a good pickle to clean out all of the sand, etc.?

A.—The best pickling solution for iron castings that are to be brass plated is hydrofluoric acid. It will remove the sand, etc., and attack the iron but little. This acid and instructions for its use may be obtained from E. R. Dempwolf & Co., York, Pa.—J. L. J.

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Q.—We desire to learn about the improved methods of handling brass ashes and skimmings from brass foundry work.

A.—Brass ashes and brass skimmings are best treated in large quantities by smelting in a reverberatory furnace using a reducing flame. If much core sand or molding sand is present, limestone or other flux must be added in proper amount. The metal recovered is run into ingots and the slag smelted in a cupola to obtain shot metal. The cupola slag can be discarded if the smelting has been properly carried out. The metal recovered is lastly run down in crucibles, such additions being made as are necessary to turn it into "specification metal" for brass foundry uses. Of course, if iron is present in the ashes or skimmings it must be removed by an electro magnet before smelting.—J. L. J.

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Q.—What is the best way to make a first-class babbitt metal?

A.—The most satisfactory metal for general use is the government standard mixture. It is made by melting together in a crucible 4 pounds of copper, 8 pounds of antimony and 8 pounds of tin. When melted, stir well and add 16 pounds more of tin. Then either granulate by pouring into a tub of water or pour into small ingots. This forms the hardener, 32 pounds of which are added, a little at a time, to 64 pounds of tin melted in an iron kettle or graphite crucible. Pour into ingots. Get tin fairly hot but protect with cover of powdered charcoal.—J. L. J.

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Q.—We are sending you two samples of manganese bronze. Can you tell us what causes the crystalline effect and the yellow centres?

A.—The yellow centres in the samples sent are shrink spots. The bronze is of fair quality but has either been made from sheet scrap or fine wire, or if made from ingot copper, the copper has been allowed to "soak in the fire too long" and it has become more or less oxidized.—J. L. J.

Q.—Please tell us the difference between desilverized and corroding lead. What would be the best for lead castings, to mix with tin, and also for making brass?

A.—There is practically no difference in the purity of desilverized and refined lead, as leading brands of each assay over 99.99% lead. Electrolytic lead will assay even higher. When lead of such purity can be obtained it does not seem to be a matter of importance by what process it is made and it would all seem equally good for corroding, making babbitt, solder or any other purpose. Some brands of refined lead, however, command a premium and it is because of their freedom from oxides and dross. A practical test is to melt down about 100 pounds of the lead in a new crucible at a low heat, skim off the dross and pour into ingots. Some of the brands of refined lead, known to the trade as "chemical leads," will lose from 3 to 4 per cent. when thus tested. It is more necessary to use a clean lead when making lead castings, babbitt and solder than when manufacturing brass, as the amount added to brass is small as a rule.—J. L. J.

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Q.—Would you please give the composition of the enclosed strip? I believe it is used by dentists, and oblige the undersigned, an old reader of your valuable journal

A.—The sample received from you was pure sheet tin of .009" thickness or No. 31 B. & S. gauge.—J. L. J.

## MECHANICAL

Q.—We should like to know whether any United States or foreign patents are in existence with regard to the Sectional Seven or Nine Die Tandem Rod Drawing Machines having only one horizontal shaft to drive the drawing drums (the latter upon horizontal spindles) and the finishing block, by means of bevel gears, together with any kind of stringing device.

A.—As far as we know there is no patent which covers the so-called Seven and Nine Die Tandem Rod Drawing Machine. The base patent on this type of wire drawing machine, as well as one covering the revolving dies, ran out several years ago. There is a patent No. 487,844 covering the endless chain stringing device which runs until December 13, 1909. This device is used in connection with these machines for stringing the dies. In certain sections the revolving dies are not considered of any value.—A. W. L.

## GALVANIZING

Q.—Will you kindly publish a formula for a pickle for electro-galvanized drawing steel that is commonly called lime pickled steel?

A.—Mix 1 pound sulphuric acid and 1 gallon of water; dissolve in it 2 ounces of zinc, then add ½ pound nitric acid.—W. C.

## CHEMICAL

Q.—We are interested in securing a recipe for a color known as "Chocolate Bronze" or otherwise known as "Army Bronze." You will probably recognize the color on the uniforms of soldiers, such as the cap and collar ornaments. If you are in touch with anyone that can furnish us the recipe for this color, we certainly would deem it a favor to one of your subscribers.

A.—Prepare a solution of barium sulphide, about ¼ to ½ oz. to each gallon of water. Use the solution hot. Copper plate the buttons in a regular cyanide of copper solution, then wash in the regular manner, and immerse in the solution until a deep brown is produced. The buttons should then be lightly scratch brushed. This may not be necessary. Then the buttons should be sand blasted to produce the dead effect. Afterwards lacquer in a satin finish lacquer by dipping.—C. P.

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Q.—I would like a formula for applying some substance to a brass or copper tube on the outside that it could be immersed in a bath of molten tin and the tin not adhere to the outside, or if it did that it could be easily removed. In other words, am desirous of learning some good economical process by which tubes can be tinned *inside* without tinning on the *outside*.

A.—You might try the following method. Close up both ends of the tubes with rubber corks or plugs, then immerse in a solution of commercial sodium silicate, commonly known as water glass. Allow the tubes to dry for a number of hours, then proceed with the tinning in the usual manner. The tin should not adhere. If mechanical methods are not used in polishing the outside of the tubes, a solution of commercial hydrofluoric acid can be used to remove the film of glass, but the ends of the tubes must be closed to prevent the action of the acid upon the tin. The brass is not affected by the acid.—C. P.

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Q.—I am very anxious to get a process for copper plating wood.

A.—The metallizing of wood is as follows:

The wood is first coated with two or three very thin coats of orange shellac prepared by dissolving 2 ounces of shellac in 1 pint of wood or denatured alcohol. This coating protects the wood from the action of the solutions used in the process. When the shellac is thoroughly dry apply a very thin coat of turpentine, copal varnish or hard oil finish. Allow to dry for a short time; when "tacky," dust over a coat of pure copper bronze powder with a camel's hair brush, care being taken to completely cover the wood with the powder. A second application should be made with a stiffer brush so that the coat becomes perfectly smooth. The wood when perfectly dry is then ready for plating. Make up a solution of—

| | |
|---|---|
| Sulphate of copper | 2 lbs. |
| Sulphuric acid | 4 ozs. |
| Water | 1 gal. |

Dissolve in hot water and allow to cool. Use anodes of pure copper.—C. H. P.

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Q.—We want a good black finish for phosphor bronze. The finish must stand the weather.

A.—A solution of hydrosulphuret of ammonia applied with a brush will probably give you better results than anything of a chemical nature. This may be diluted with warm water. For richness of effect, a good black or rubber-finish lacquer, applied after the bronzing solution had darkened the bronze, may be used. It would be necessary to wash the surplus bronzing solution from the metal and before applying the lacquer.—C. H. P.

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Q.—We make a nail clipper having a small steel spring to open the jaws. We are troubled with the breaking of these springs when the clippers come from the nickel-plating room. Can you help us out?

A.—We are of the opinion that your trouble arises from the use of a concentrated muriatic acid dip, rather than from the nickel bath. We have noticed that revolver springs would invariably crack when muriatic acid was used. Avoid using the muriatic acid if possible. An electric cleaner would probably overcome your trouble.—C. H. P.

Q.—Are you able to inform us of what kind of chemicals and the process used in the coloring of bronze wire for the weaving in dark bronze window screen wire cloth?

A.—The solution for coloring wire for your purpose is as follows: For each gallon of solution—

| | |
|---|---|
| Caustic soda, 98 per cent..... | 2 ozs. |
| White powdered arsenic..... | 4 ozs. |
| Hot water ..... | 1 pt. |

Mix thoroughly, then add to a mixture of ½ gallon muriatic acid and ½ gallon of water. The solution should be maintained at a temperature of 160 degrees F. Use a large sized acid pot holding at least 20 gallons. Use a coil of lead to pass steam through for heating. According to the color desired the solution may be considerably diluted. To maintain the strength of the bath a little of the original solution should be added from time to time. The wire before immersion should be free from grease or oily substances.—C. H. P.

Q.—Kindly tell me what was the trouble with my 300-gallon nickel solution. The plater took out a half rod of work and filled the space with new work. When he took out the remaining half rod of work it was black and covered with bubbles. All work placed in the vat came out the same. Hydrometer stood at 6 degrees and the solution did not affect either blue or red litmus paper.

A.—We do not see why your solution should act as above, unless every trace of nickel had disappeared, leaving an ammonium sulphate. The same result would occur if a pound or so of copper sulphate had been put into it as a very small amount of copper salt added to a nickel solution will cause a blackish deposit. If the bath was devoid of nickel, 2 to 3 ounces of single sulphate of nickel to the gallon of bath would have proved beneficial.—C. H. P.

Q.—We would like some information concerning the casting of copper anodes. We find the copper does not dissolve from the anodes uniformly but eats away in spots, which leaves the anode looking like a sponge. We also notice that the anodes in about twenty minutes are covered with a dark coating.

A.—If you desire to produce a closer grained anode, add 1 pound of 10 per cent. silicon copper to every 100 pounds of copper melted. We do not ourselves see any particular advantage in a close grained anode over a porous one, as the latter dissolves more readily and more quickly enriches the solution. The dark coating formed is probably a form of sulphide, but is readily reduced when the solution is at rest, especially if the solution contain free cyanide. Lake copper, as a rule, does not show this coating as do some other grades.—C. H. P.

Q.—We have call for a soft enamel such as used on college emblems. Where can we procure same, and how is it used for work in quantity?

A.—Soft enamels for the purpose mentioned are made up from gum copal, cut with wood or denatured alcohol and then the desired color ground in. Enamel made up in this manner dries very quickly; if placed in a temperature of 160 degrees F.; it becomes very hard in 15 minutes. The majority of this work is done by painting the articles with camel's hair pencil brushes. The enamel can also be used as a dip coat, cleaning off the relief parts with a rag and a thinner of wood or denatured alcohol. Wm. Zinnzer & Co., of William street, N. Y., make this kind of enamel and can give information on this subject.—C. H. P.

Q.—We are looking for the most up-to-date method of doing the best class of enameling (japanning) on brass and iron work, as clock-cases, typewriters and flat panel work. What we want is a smooth, glossy surface produced at the lowest cost.

A.—One of our correspondents uses the following to produce the finish as above: The articles, if of iron, are cleansed in the usual manner and then lacquered with a dead black or rubber finish lacquer; this is applied by dipping or brushing. The coat will dry hard with the aid of heat in 15 minutes; when thoroughly cold the articles are given a coat of japan (for cheap work common air-drying japan made up with asphaltum and gasolene). For baked japan that is to be rubbed and varnished, only a good grade of baking japan can be used. Of course, the usual baking process is used to harden the surface. The articles are then polished by the aid of pumice stone and water; buff wheels can be used for this purpose. The articles are afterwards varnished with No. 1 copal extra varnish. The Matchless Metal Polish Co., of New York, also produce a composition for this purpose. Articles of brass should first be oxidized by any of the usual methods.—C. H. P.

Q.—I am making oxide finishes and I would like a formula for hot copper. How is the oxide finish produced that may be buffed instead of scratch brushed?

A.—An excellent copper bath can be made up as follows:

| | |
|---|---|
| Plastic carbonate of copper..... | 10 ozs. |
| Bisulphate of soda..... | 14 " |
| Carbonate of soda..... | 16 " |
| Potassium cyanide ..... | 16 to 18 " |
| Water ..... | 5 gals. |

To prepare: Dissolve the soda salts in part of the water, then add the carbonate of copper, dissolve the cyanide in the remaining cold water and mix the two slutions. The solution can be used hot or cold and gives a beautiful red color. Use cast or electrolytic copper anodes. To produce a black finish upon copper without scratch-brushing, polish your coppered articles lightly, then cleanse in the usual way and plate in a batch consisting of:

| | |
|---|---|
| Caustic soda ..... | 5 ozs. |
| White arsenic ..... | 8 " |
| Cyanide potassium .....½ | " |
| Water ..... | 1 gal. |

Use anodes of iron or carbon. To prepare: Dissolve the soda in a little boiling water, then add arsenic, adding the rest of the water and finally put in the cyanide. Do not use too strong a current. This gives a beautiful black on brass, bronze or silver when articles have been previously buffed. To prepare a brass bath use the formula given for hot copper and add carbonate of zinc dissolved with equal parts, by weight, of cyanide, producing a concentrated solution. Add ½ to ¾ oz. to each gallon of solution, and if necessary add a little carbonate or water of ammonia to bring up the color.—C. H. P.


# Associations and Societies

REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

## AMERICAN BRASS FOUNDERS' ASSOCIATION.

American Brass Founders' Association.—President Charles J. Caley, New Britain, Conn.; secretary, W. M. Corse, 54 Lathrop avenue, Detroit, Mich.; treasurer, John H. Sheeler, Philadelphia, Pa. The object of the association is purely educational, and is accomplished by the collection of such information as will be of benefit to the members and to general shop practice, by the presentation of papers on appropriate subjects, and by the publication of such literature.

In connection with the American Foundrymen's Association and the Foundry Supply and Manufacturers' Association, The American Brass Founders' Association held a joint meeting the past month to adjust certain differences which had sprung up between these associated organizations. The secretaries report every point at issue was settled harmoniously and satisfactorily to all.

During the past month the two foundry associations have issued the reports of the proceedings and the papers of the conventions held in Toronto last June. The reports contain some valuable papers.

## ASSOCIATED FOUNDRY FOREMEN.

The Tri-City Associated Foundry Foremen held their October meeting at the Harper House, Rock Island, Ill., October 24. Charles C. Kawin, of the Chas. C. Kawin Company, Chicago, gave an address on the "Advantage of Co-Operation Between the Chemist and the Foundry Foreman." He showed that each was helpless without the support of the other. But when they worked together each advanced the cause of the other. And the management reaped large returns in the shape of cheaper production.

The New England Manufacturing Jewelers and Silversmiths' Association, 42 Weybosset Street, Providence, R. I. Secretary Foster reports that the efforts of the association during the past month have been directed toward proposed changes in the tariff. The American jewelry and silversmith industry has, he says, been very much hurt by the German and French tariff agreement, especially the German, because of the lack of proper classification for tariff assessment of jewelry and silverware. The various manufacturers have held several meetings at Providence and Attleboro and efforts will be made to remedy the existing schedules.

Associated Foremen Platers. Since the note in the October number of The Metal Industry, stating the efforts of Charles H. Proctor and C. S. Barbour, Jr., to form an association of foreman platers, The Metal Industry has received a number of replies from all over the country stating that the different platers would like to join or form such an association. It is probable that as soon as a sufficient number of replies are received an organization will be formed which will be to the educational welfare of the platers what other associations have been to the founders and machinists.

The National Founders' Association held their 12th annual convention at the Hotel Astor, New York, November 18 and 19. Various commercial questions between employers and employees were attended to and the following officers were elected for the coming year: Henry Carpenter, Providence, R. I., president; O. W. Briggs, vice president; F. W. Hutchins, Detroit, Mich., secretary, and the People's Bank of Detroit, Mich., treasurer.

## BIRMINGHAM METALLURGICAL SOCIETY.

The annual meeting of the Birmingham Metallurgical Society was held on October 31 at the Imperial Hotel, Birmingham, England, A. H. Hiorns, presiding. It was reported that the membership at the end of the year was 114, a net gain of 9 on the year. A balance was carried forward of £37 5s., compared with £29 during the preceding year. The committee reported that in regard to the scientific and practical value of the papers contributed and the works visited, the year had been the most successful in the history of the society. They anticipated that eventually the society would be a power in the metallurgical world. One of the features of the year was the enrolling of prominent local metallurgists as honorary members, the list including such well-known names as those of Neville Chamberlain, W. Waterhouse, G. Hatton, R. K. Gibbins, J. J. Morcam and George Tangye. It was hoped the list would be greatly augmented during the coming year. Congratulations were offered to Mr. T. Johnson on his appointment to the important position of general manager of the works of the English-Australian Copper Company, Ltd., Newcastle, New South Wales.

Mr. A. H Hiorns was unanimously re-elected president, the following were chosen vice presidents, J. H. Stansbie, I. E. Lester, S. M. Hopkins; treasurer, H. Rogers; secretaries, W. J. Rees and H. B. Jacks, re-elected.


# PERSONALS


ITEMS OF INTEREST TO THE INDIVIDUAL.

Alfred Sang, vice-president of the Garland Nut & Rivet Company, Pittsburg, Pa., and well known for his investigations into the theory and practice of galvanizing and other methods of protecting iron and steel from corrosion, will leave next February for Paris, where he will remain permanently. Mr. Sang will continue to devote his attention to developing and perfecting the art of galvanizing, and to other subjects of a similar nature, returning to this country annually to look after his interests here, which he will retain and with which he will continue to be identified. At present Mr. Sang is at work on a new book, to be published next spring, in which the subject of corrosion of metals will be treated exhaustively.

Barton Haselton, secretary and treasurer of the Rome Brass & Copper Company, Rome, N. Y., sailed for England early in November to be gone several weeks.

L. J. Krom, of Plainfield, N. J., has become Assistant Editor of The Metal Industry. Mr. Krom is a graduate of Lehigh University in the course of chemistry and metallurgy and since graduation has been connected with a number of metal working establishments, as metallurgist and superintendent. For four years Mr. Krom was with Randolph and Clowes, of Waterbury, Conn., and for six years with the Chase Rolling Mill Company of the same city. He has also had several years' experience as research chemist in an optical works and as superintendent of an aluminum foundry.

Frank J. Clark, formerly connected with the Cutter, Wood and Stevens Company, of Boston, Mass., as salesman of their plating and polishing supplies, has accepted a position with the Zucker & Levett & Loeb Company, New York City, in the same capacity. Mr. Clark has the New England territory.

### L. T. WOOSTER.

L. T. Wooster, a director in and superintendent of the mills of The Seymour Manufacturing Company at Seymour, Conn., died at his home in Seymour on Friday, November 27, 1908, aged seventy-eight years. Probably he was the oldest man actively engaged in the brass rolling mill business in the State.

Mr. Wooster was born in Waterbury in August, 1830, and was the seventh in descent from Edward Wooster, who came from England in 1630. At an early age he learned the trade of millwright and assisted in building some of the large brass mills in the Naugatuck Valley. In 1852 he entered the employ of The Waterbury Brass Company as a brass roller and after a few months was promoted to be superintendent of the mill, a position he held until 1862. In that year L. W. Coe withdrew from the management of The Waterbury Brass Company, organized the Coe Brass Manufacturing Company, in which Mr. Wooster was a director. This company purchased The Wolcottville Brass

L. T. WOOSTER.

Mill and began the manufacture of brass and wire in 1862, Mr. Wooster having charge as superintendent of the mill in Wolcottville (now Torrington) until 1870. From 1871 to 1880 he was superintendent of The Osborne & Cheeseman Company's mill at Ansonia.

May 6, 1880, he acquired an interest in The Seymour Manufacturing Company at Seymour, Conn., where a small mill had been erected in 1878 by two brothers of Mr. Wooster and Ira E. Clough, and became superintendent of the mill, which was considerably enlarged under his superintendence. Here in a continuous service of more than 28 years, he completed his long term of more than 56 years as a practical and successful brass and German silver manufacturer. Mr. Wooster leaves a widow, three daughters, Emma M. and L. Theresa residing at home, and Nellie (Mrs. Harlan W. Cooley) residing in Chicago, also four grandchildren.

The funeral was largely attended at his late residence on Monday, November 30. The services were conducted by the Rev. Dr. Tullar, of New Haven, and Rev. Mr. Lewis of the M. E. Church of Seymour. The honorary pall bearers were Judge G. H. Cowell, of Waterbury; Hon. Stiles Judson, of Bridgeport; William E. Sessions, of Bristol; General Charles H. Pine, of Ansonia; Col. N. H. Heft, of Bridgeport, and Thomas L. James, of Seymour. The active bearers were from the office force and department foremen in the mills of The Seymour Manufacturing Company.

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L. L. Munn, president of the Arcade Manufacturing Company, manufacturers of molding machines, located at Freeport, Ill., died November 23rd, aged 79 years. Mr. Munn had retired from active business for the past fifteen years.

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George Waldo Corbin, prominent in the manufacture of hardware at New Britain, Conn., died at his home in that city on November 30th. Mr. Corbin in his lifetime was actively connected with the Corbin Cabinet Lock Company, Union Manufacturing Company, Corbin Brothers Company, Corbin-Church Company and the Dean Steel Die Company, having been president of both of the last named companies. He was also prominent in founding the People's Savings Bank, was a trustee of the New Britain Trust Company and of the Sovereign Trading Company. He had served as councilman and mayor of New Britain.

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In the Technical Publicity Association Bulletin for November, C. S. Redfield, advertising manager of The Yale and Towne Manufacturing Company, New York City, makes a few pointed remarks on foreign and American trade journals. In general Mr. Redfield believes the best results may be obtained all over the world by advertising in American trade papers.

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Herbert J. Hawkins, whose name is familiar to the plating fraternity as the author of "Polishing and Plating of Metals," is now connected with the Dow Chemical Manufacturing Company, of Mansfield, Ohio, in the sales and expert departments.

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The Rockwell Furnace Company, 26 Cortlandt street, New York, manufacturers of oil furnaces, has just made an addition to their staff in the person of Frank Zeller. Mr. Zeller has had a long experience in the brass foundry line, having been connected with the B. F. Sturtevant Company, the Hancock Inspirator Company and the Kelley & Jones Company. He thoroughly understands the mixing and melting of metals and the operation of modern oil furnaces. Mr. Zeller is now calling on the friends of the Rockwell Furnace Company in the interest of their open flame and tilting crucible oil furnaces, acting as assistant to W. S. Quigley, who has given the question of melting furnaces special attention for the past eight years, and whose increased duties as vice-president of the Rockwell Furnace Company prevents his visiting the trade as frequently as formerly.

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# PATENTS

**REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.**

903,168. November 10, 1908. CIRCULAR RIDDLE. Silas H. Brand, Chicago, Ill. A riddle designed to be manufactured by machinery and in which the metal fabric and the finishing loop can be fastened to the body of the riddle in one operation. A further object is to provide a riddle which can be quickly constructed and the parts of which when once assembled will not come apart.

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903,497, 903,498. November 10, 1908. SHADE HOLDER. Walter H. Perkins, Waterbury, Conn., assignor to The Waterbury Manufacturing Company, Waterbury, Conn. This invention relates to an improvement in shade holders, and particularly to shade holders for incandescent electric lights, the object of the invention being a simple and convenient means for attaching the shade or globe holders to the lamp sockets.

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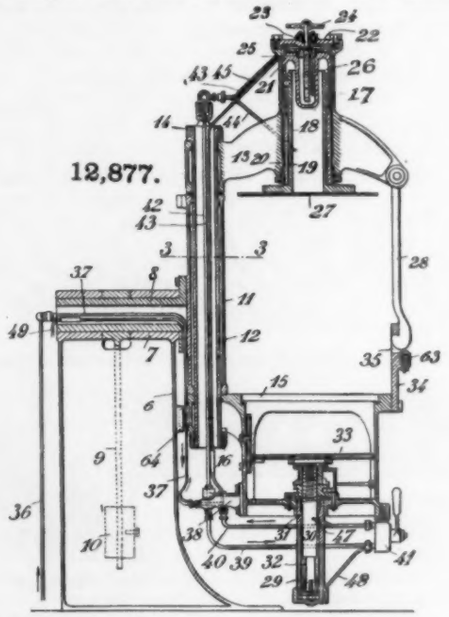
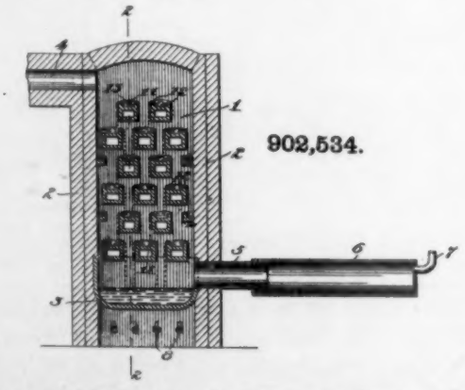
12,877. November 10, 1908. Reissue of 867,104. September 24, 1907. MOLDING MACHINE. Philibert Bonvillian and Eugene Ronceray, of Paris, France, assignors by mesne assignment to E. H. Mumford Company, of Philadelphia, Pa. A hydraulic molding machine so pivoted as to swing through a half revolution. This machine is specially adapted for molding articles with cores, of

fairly large size, which are exposed to the risk of breaking under their own weight. After the mold is made in the ordinary way



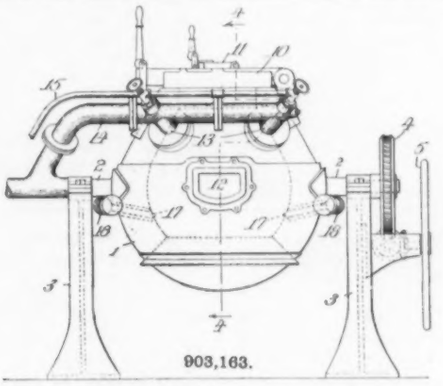

the machine is turned over so that the core, which was at the upper end, is now at the bottom end and is no longer in danger of breaking during the removal from the mold.

902,534. October 27, 1908. METALLURGICAL CONDENSER. Woolsey McA. Johnson, Hartford, Conn. A simple and inexpensive apparatus for condensing metallic vapors of zinc which will operate at a very high degree of efficiency. This condenser consists of a condensing chamber, with horizontal flues traversing the same, the flues being constructed to retain a film or pool of molten metal and disposed in vertically staggered series. A collecting basin in the lower portion of the chamber and means for transferring the molten metal from the bottom basin to the recesses in the horizontal flues.

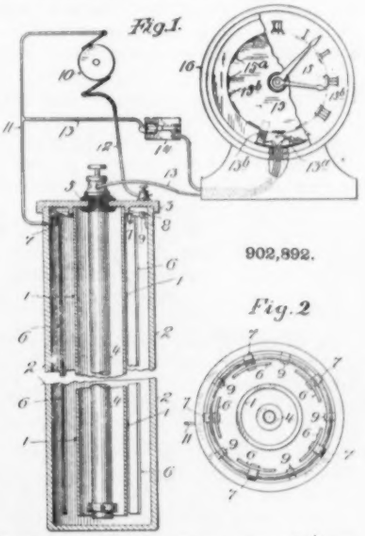



903,404. November 10, 1908. METHOD OF SEPARATING ELECTRO-DEPOSITED METALS FROM LEAD MATRICES. Charles Reverdys, New York, N. Y., assignor to F. Wesel Manufacturing Company, New York, N. Y. In a lead matrix having deep cavities, it is difficult to apply the graphite usually used in such a way as to form an effective separating layer on account of the trouble in reaching the deep parts with the bristles of the brush. This invention overcomes this difficulty by the use of carbonic acid gas, which produces a thin film of carbonate of lead, answering all conditions. In order to further facilitate the separation of the matrix and shell it has been found advantageous to spray on the matrix with the gas an oily or fatty substance such as paraffin oil or an alcoholic solution of rosin.

903,163. November 10, 1908. FURNACE. Samuel T. Bleyer, Chicago, Ill., assignor to the Hawley Down Draft Company, Chicago, Ill. A furnace that can be used for melting purposes alone, or for both melting and refining or converting in a continuous and uninterrupted manner. In the melting operation gas or vaporized oil is introduced as jets of flame into the furnace and directed upon the body of metal or ore on the hearth of a tiltable furnace body or chamber. In the refining and converting operation a series of twyers direct blasts of air upon and into the body of molten metal, with the result that the metal is refined or converted. This furnace is an improvement upon the original Schwartz Furnace. One important feature of this furnace lies in the fact that the hearth is perfectly flat in order that all the molten metal shall be of uniform depth. This construction results in a uniform quality of metal, inasmuch as all the metal receives the same action of the flame and of the air blast.




902,892. November 3, 1908. METHOD OF AND APPARATUS FOR ELECTROPLATING. George A. Lutz, Plainfield, N. J., assignor to American Circular Loom Company, Portland, Me. An apparatus designed to secure the plating of inside and outside of hollow articles and to obtain a uniform thickness of plate on both sides. An electroplating outfit comprising a tank, means to support a hollow article, means to support simultaneously anodes within and without said article, also a generator with one side of the circuit connected with both sets of anodes, and a clock controlled make-and-break mechanism in the circuit of the inner anode to automatically make and break said circuit independently of the circuit of the outer anode.




901,607. October 20, 1908. ALUMINUM-SOLDER. William H. Finfrock, Chicago, Ill. A solder for aluminum that is thoroughly practical and commercially valuable because it can be melted at a comparatively low temperature and when applied to make a joint is so strong that one of the parts of metal themselves will break before the solder will give way. This solder consists of a compound of zinc and phosphor-tin mixed in the proportion of four ounces of zinc to one-half ounce of phosphor-tin, said phosphor-tin consisting of five per cent. phosphorus and ninety-five per cent tin.

901,758. October 20, 1908. ELECTROLYTE. Abraham Van Winkle, Newark, N. J., assignor to the Hauson & Van Winkle Company, Newark, N. J. A new and improved electrolyte for use in the electro-deposition of zinc on iron and steel, and with a view to increase the conductivity of the solution, to improve the color of the deposit and to ensure a perfect plating, especially of concave surfaces. In actual practice thirty per cent. hydro-fluoric acid is saturated with silica, and this solution in turn is saturated with zinc. The resultant liquid is then diluted with water to about ten per cent. Baumé, and the zinc is slightly neutralized by the addition of a small quantity of an alkali, such as carbonate of ammonia.

903,558. November 10, 1908. BINDER FOR SAND CORES, BRIQUETS, ETC. Edward D. Frohman, Pittsburg, Pa. A liquid composition for use as binders for finely divided material, composed of molasses treated with lime, the lime not exceeding four per cent. of the composition.

901,932. October 20, 1908. MOLDING MACHINE. Frederick W. Hall, Merchantville, N. J., assignor to J. W. Paxson Company, Philadelphia, Pa. A molding machine where the flask fittings are united in mechanical co-action so as to obtain the following results.

First. To distribute the sand-ramming strain by means provided to make the pattern frame more or less resilient or yielding relatively to the flask elements, under the impact blow. Second, to produce a perfect sand mold without the provision of any means independent of the flask elements and their fittings, to allow lateral movement of the pattern frame relatively to the flask members during the rapping of the frame to release the pattern from the sand; and finally to readily and properly assemble and support the frame and the flask members in operative alignment and to enable the cope member to be guided to proper position relatively to the pattern frame in lifting it on or off the same.


# TRADE NEWS


**TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.**

Reed & Barton, silverware manufacturers of Taunton, Mass., are again employing their entire factory force.

It is reported that the Union Metal Works, of Chelsea, Mass., are building a new foundry 50 x 80 and a machine shop 70 x 100.

The Gorham Manufacturing Company, of Providence, R. I., manufacturers of silverware, report an increase in orders and are at the present time employing 1,670 hands.

The Riverside Metal Company, Riverside, N. J., manufacturers of German silver and phosphor bronze, contemplates making extensive additions to its plant in the near future.

It is reported that the Pfau Manufacturing Company, manufacturers of brass goods at 536 Reading road, Cincinnati, Ohio, will build a new plant in one of the suburbs of that city.

The Nathan Manufacturing Company, 416 E. 106th street, New York City, started on November 23 to run their plant full time. Since June of 1908 they have been running four days a week.

The G. C. Hudson Company, of Attleboro, Mass., manufacturers of plated jewelry and novelties, are at present overrun with orders and are operating their factory thirteen hours per day.

The Michigan Copper and Brass Company, of Detroit, Mich., beginning the week of November 16, started to operate their mills overtime until nine o'clock four nights each week. They expect this condition to continue until January 1.

The Ohio Metal Company, 502 West Kimball street, Columbus, Ohio smelters, refiners and dealers, reports a good increase in business the last month and many of the orders for their metals came from local manufacturing plants.

The Goodwin & Kintz Company, Winsted, Conn., in giving out a prosperity interview state that their business is now in a practically normal condition and that they have been running overtime. They are manufacturers of fine metal goods.

Paye & Baker, manufacturing jewelers, of North Attleboro, Mass., started to operate a part of their factory on a 24-hour-a-day basis beginning November 24th, and the other departments are on a 13-hour-a-day schedule. At the present time nearly 500 hands are employed.

The H. C. Cook Company, Ansonia, Conn., are very much interested in the new alloy known as "Monel Metal." They say that sheet monel answers well to all the operations of sheet manufacturing as it solders easily, flows right in stamping and spinning and takes a nice finish.

The Wetherill Finished Casting Company, Philadelphia, Pa., reports such a heavy demand for their die-cast bearings and parts that their manufacturing facilities are taxed to the utmost. The company is at work on a furnace for making die-castings of manganese bronze, red brass, etc.

The Crosby Company, of Buffalo, N. Y., manufacturers of stamped sheet metal goods, report that they are installing some new equipment in the line of elevators, motors, transformers, shafting, pulleys, belting, etc., and several large power presses of double geared crank and toggle patterns.

M. Blassberg & Co., brass and copper founders of Turners Falls, Mass., are doing a good business in brass, bronze and aluminum work and have opened offices at Shelburne Falls, Mass. Blassburg & Co. are at present operating one Hawley Down Draft Furnace and four crucible furnaces.

Clum & Atkinson, Rochester, N. Y., have built an additional story on their machine shop, which doubles their capacity in this department. They are now in a position to furnish brass castings either in the rough or finished, as may be desired. Motorcycle and automobile parts are two of their special lines.

The Whiting & Davis Company, manufacturing jewelers of Plainville, Mass., are at the present time operating their plant on a thirteen-hour-a-day basis. The company had been working ten hours a day for some time, but the demand for their goods necessitated the thirteen-hour-per-day schedule.

The new works of the Dundee Brass Manufacturing Company, of Dundee, N. Y., which has been reported in THE METAL INDUSTRY, is progressing satisfactorily. The building is up and roofed and the company is now putting in floors and partitions. It is expected to have the plant ready for operation by the first of the year.

The Standard Gauge Manufacturing Company, formerly located at Syracuse, N. Y., moved on December first to Foxboro, Mass., where they occupy a foundry, 60 x 150 feet, and a two-story pattern shop, 30 x 42 feet. The Standard Company are manufacturers of pressure and vacuum gauges, oil filters, exhaust heads, etc.

The Wilcox Silver Plate Company, of Meriden, Conn., is strengthening and improving some of its buildings which were found to be faulty in construction. When the work is com-

pleted the plant will be in better shape than ever. The company have a model shop for the manufacture of silver-plated ware, sterling silver and cut glass.

The Allyne Brass Foundry Company, of Detroit, Mich., have decided not to go ahead with their proposed new plant, but have purchased a piece of land and the building located at the south of their present plant. The building is of two-story brick construction and the Allyne Company intend using it for the manufacture of plumbers' brass goods.

C. J. Tagliabue Manufacturing Company, of New York City, manufacturers of temperature and pressure indicating, recording and controlling devices, have started a small factory at Cleveland, Oswego county, New York, for the manufacture of thermometers for which they have furnished all of the machinery necessary from their factory at Brooklyn, N. Y.

The Westinghouse Lamp Company, formerly located at West 23d street, New York City, is now settled in their works at Bloomfield, N. J. Their present plant has an output of about 18 million lamps per year and is built entirely of concrete. The main building is 501 feet long and 100 feet wide and the store house is approximately half the length of the main building.

The Knudsen-Von Kothen Manufacturing Company are having patterns made to begin to manufacture a complete line of regular valves and a special high pressure valve. This company was organized in November, 1907, with a capital of $200,000. They will utilize, for the present, a large building owned by some of the stockholders. Their place of business is at Dalton, in Cook county, Ill.

The incorporation of the Ontario Brass Rolling Mills, Toronto, Canada, reported in the October number of THE METAL INDUSTRY, is a reorganization of the Canada Brass Rolling Mills located in that city. The personnel of the old company is entirely out and J. F. Brown is practically the present owner. The mills will not be operated this winter but the new owner expects to start early next summer.

The Crane Company, of Chicago, Ill., report that the trade journals have greatly exaggerated the importance of their proposed plant at Pittsburg, Pa. It is the company's intention to build a small foundry at that city this winter or next spring and the business will be conducted under the name of the Crane-Best Company, combining with the Best Manufacturing Company, of Pittsburg. The plans at present are only tentative.

C. G. Hussey & Co., Pittsburg, Pa., will shortly put into operation a new 24 in. x 72 in. plate mill, for rolling copper plates, which has been built for them by the A. Garrison Foundry Company, of Pittsburg. This is the second mill of this size in the Hussey plant. During the past year this mill has handled considerable special work and has been very successful in rolling tough, hard metals, such as manganese bronze, monel metal, etc., for some of its customers.

The plants of S. L. & G. H. Rogers Company at Wallingford and Hartford, Conn., manufacturers of plated flat ware and kindred koods, are very busy, beeing now operated twelve hours per day. The management is continually bringing out new designs of flatware and a new pattern, "The Colonial," is considered to be very fine. The president and general manager of the company is now George M. Hallenbeck and under his direction the factories have grown steadily.

The Ajax Valve Company, sole manufacturers of elastic metal disc valves, have opened up a place of business at 331 W. Lake street, Chicago, Ill. They will occupy the whole of a three-story building. For the present they will only do the assembling of the valve at this place, having the molding and machining done on the outside. The Manufacturers' Equipment Company, Chicago, have furnished the patterns and other equipment for this company. This valve is designed specially for use on high pressures and superheated plants.

R. P. Bauer and J. Van Valkenburg had planned to establish a plant at Jackson, Mich., to be known as the Jackson Brass Foundry, but the sudden death of Mr. Bauer has upset the plans of the enterprise. Mr. Van Valkenburg reports that there is a good business to be had in Jackson for a brass foundry and that if he obtains the right sort of a foundry foreman he may go on with the plant. Mr. Bauer had been employed for the past twenty years at the Weatherwax Foundry in Jackson and was a practical man and could command business for the new enterprise.

The Finkell-Hackmeister Chemical Company, Pittsburg, Pa., are supplying their customers with a chart which contains valuable information for nickel, copper and silver platers. If the amperage of the current and the weight of the required deposit, in pennyweights, is known, the chart will tell the number of minutes which the article must remain in the solution in order to obtain the desired deposit. The time can be read from the tables and the exact cost readily determined. An immense amount of labor was expended in making the calculations summarized on the chart and it should prove very helpful to the plater.

A. Keiffenheim & Sons, of Newcastle-on-Tyne, England, announce that the branch of their business relating to the manufacture and sale of special ingot metals will be carried on beginning November 1 under the style of The Metallurgical Company, as they have found it desirable to make this change of name owing to their supplies for Government work, but in all other respects this branch of their business will be conducted as before and concurrently with the business of A. Keiffenheim & Sons. The Metallurgical Company make a specialty of gun metal, phosphor bronze, manganese bronze and white metal ingots and other special alloys.

The American Car and Ship Hardware Manufacturing Company, of New Castle, Pa., who are general manufacturers of brass and bronze railway, street car and motor boat trimmings, also heavy brass and bronze mill bearing, have lately cast some fiine art brass ware which was placed on exhibition at the jewelry store of Mather Brothers, New Castle, Pa. They have a large foundry, finishing shop, polishing department and plating room and they report that their new line of art work which they have recently taken up has so far proved a great success. The company's various departments cited shows how metal working establishments combine the various arts to which THE METAL INDUSTRY relates, viz.: Metallurgical, mechanical and chemical, and likewise how these various plants are continually in the market for metals, machinery and supplies and how manufacturers and sellers of these products can reach the greatest number of buyers of them by taking advertising space in THE METAL INDUSTRY.

## FIRES

The German Metal Works, located at 754 Van Ness avenue, San Francisco, Cal., was recently destroyed by fire.

It is reported that the Peter Chalmers Company, brass founders of Racine, Wis., was recently damaged by fire to the extent of $2,500.

The St. Charles Brass and Fixture Company, East Main street, Aurora, Ill., suffered a loss by fire on November 12, but were running again in two days.

The Acme Plating Company, of Columbus, Ohio, has suffered a loss by fire amounting to $750 covered by insurance. The company is refitting, sending some of its work out and will soon be running again the same as formerly. The fire spoiled the plating room solutions.

Fire recently damaged the plant of the Frankford Metal Company at Scattergood and Eadom streets, Frankford, Philadelphia, Pa., to the extent of $2,000. The place is operated as a brass foundry by Frank F. Meyers. The business is now being carried on the same as ever.

The brass foundry of Wm. J. Lemmer, located at 22 Bradley street, Detroit, Mich., was destroyed by fire on November 12, damage $2,500. Mr. Lemmer is at present located in temporary quarters and expects to rebuild a modern and well equipped foundry in the near future.

The Silver Manufacturing Company, of Salem, Ohio, have suffered a loss by fire which is reported to be from $175,000 to $200,000, but the company say this amount is exaggerated and that they have made temporary arrangements to manufacture and are now able to take care of all orders the same as formerly.

The Snyder & Baker Stove Works, of Belleville, Ill., report that the recent fire at their plant involved only the plating and polishing departments. The loss was not very large and the company are now rebuilding and expect to operate the plating and polishing departments in a few weeks.

The foundry, enameling, tumbling and grinding rooms of the Indiana Manufacturing Company, Indiana Reformatory, Jeffersonville, Ind., were totally destroyed by fire on November 15. Total damage estimated at from $125,000 to $150,000, which is covered by two-thirds insurance. The company report that they are now rebuilding.

The Syracuse Aluminum and Bronze Company, 530 Leavenworth avenue, Syracuse, N. Y., was threatened with a bad fire on November 17, but this was averted by prompt action and the fire loss confined entirely to the office. The foundry was running in the afternoon. The next day all men were at work and have been ever since, there being no interruption in the business. The foundry was not burned to the ground as has been stated in some trade journals.

A fire in the Bushee Building, Attleboro, Mass., on December 16, damaged the manufacturing jewelry plants of Barden & Hull and A. Bushee & Co. to the extent of about $15,000. On the following day the companies were shipping goods and on Monday the machinery of Barden & Hull was running. The firm secured temporary quarters in the same building expecting to return to their old quarters by December 1. Messrs. Barden & Hull had an exciting time in marshalling out employees and closing safes before they were driven out by smoke.

## FINANCIAL

The Royal Brass Manufacturing Company, of Cleveland, Ohio, have increased their capital stock from $10,000 to $25,000.

The Twentieth Century Brass Works, of Houston, Texas, has filed an amendment to its charter in the State Department increasing its capital from $5,000 to $10,000.

## INCORPORATIONS

**In addressing newly formed corporations it is advisable to include the names of the incorporators.**

Erie Art Metal Company, Erie, Pa. Capital, $20,000.

The Herschede Motor Car Company, Cincinnati, Ohio. Capital, $50,000. Lawrence B. Herschede and others.

The Central Ohio Iron and Metal Company, Columbus, Ohio. $5,000. A. Goldberg, B. Goldberg, S. Horwitz, D. Segal and J. Dubinsky.

Automatic Tap-Valve Company, Buffalo, N. Y. Capital, $100,000. Directors, Charles F. Terney, August W. Bramm and Ewald W. Terney.

Western Fence and Wire Goods Company, Cincinnati, Ohio. $10,000. John F. Mehlhope, Warner E. Madduf, Charles P. Franke, Herald P. Warcester, Karl Hilckmann.

Blume Manufacturing Company, Newark, N. J. To manufacture metal novelties. Capital, $25,000. Incorporators, Nathan Blume, Esther Blume, Joseph B. Blume, Newark.

Taylor-Hobson Optical Company, New York City. Capital, $100,000. Manufacture lenses and optical goods. Incorporators, J. R. Taylor, N. R. Green, E. J. Pierce, New York City.

Metal Arts and Crafts Company, Chicago, Ill. Capital, $10,000. Manufacture and dealing in metal goods, fixtures, etc. Incorporators, W. Moffett, John J. Sonsteby and D. S. Bobb.

Tushnet & Lancton, New York City. Capital, $25,000. Manufacturers of gold and silverware, plated ware, etc. Incorporators, M. Tushnett, O. Wolpert, Bronx; W. H. Lancton, New York City.

The Stewart Stamping Company, Moundsville, W. Va. Capital, $20,000. Incorporators, H. F. Jones, C. F. Bachman, F. C. Driehors, F. P. McNeill and H. W. Fair, all of Wheeling, W. Va.

Steam Motor Company, New York City. Capital, $25,000. Manufacture motors, engines, cars, carriages, wagons, boats, etc. Incorporators, J. M. Ellsworth, H. C. Cryder, T. A. Havemeyer, New York City.

Shattuck & Chamberlain, Inc., New York City. Manufacturing bronze and aluminum powders and liquids. Capital, $30,000. Incorporators, C. R. Shattuck, G. E. Crawford, K. S. Chamberlain, Brooklyn.

John May Foundry Company, Brooklyn, N. Y. Work in metals. Capital, $10,000. Incorporators, John May and William Klein, No. 258 Monitor street, Brooklyn; Leopold Spitz, 6 Nassau street, New York.

The Spargo Wire Cloth Company, of Rome, N. Y. Capital, $50,000. Directors, Jas. S. Spargo, John T. Wiggins, John Baynes, Wm. J. Doyle, E. Mason, Fred M. Skelly and John D. McMahon, all of Rome.

Eclipse Metal Stamping Company, New York. Capital, $4,000. Directors, Samuel J. Klein, 586 Prospect avenue; Frederick L. Klein, 578 Prospect avenue; Zigmund Israel, 208 East 109th street, New York.

L. G. Young Company, Plainville, Mass., has been incorporated with a capital of $10,000 for the manufacture of plated goods, etc. The incorporators are Thos. McCarthy, Attleboro, Mass.; Jas. McCarthy, Woonsocket, and L. G. Young.

Ideal Surgical and Supply Company, New York City. Capital, $50,000. Manufacturers of surgical instruments, corsets and patented novelties. Incorporators, J. B. Robinson, F. A. Barnes, New York City; M. C. Strang, Buffalo, N. Y.

The Grand Rapids Metal Manufacturing Company, Grand Rapids, Mich. Capital, $5,000. Manufacture and sell babbitt metal, composition, type metal and similar products. Fred K. Kramer, E. S. Walker, Geo. W. Miller, of Grand Rapids, Mich.

Wright Specialty Manufacturing Company, Camden, N. J. Capital, $30,000. Incorporators, Charles Wright, J. A. Binkey and E. H. Wright. To manufacture valves of iron, steel, copper, bronze, brass and other metals; machinists, tool makers, foundries, etc.

General Pump Appliance Company, New York. To manufacture valve seats and other parts of pumps and other engines and machines. Capital, $100,000. Incorporators, Harry N. Marvin, No. 11 East 14th street, New York; Herman Casler, Canastota, N. Y.; Charles H. Philbrook, The Belleclaire, New York.

The American Export Syndicate, Inc., with a capital of $100,000, has been formed to open in London and Berlin permanent show places of exclusively American manufactured products. The office is at 338 Broadway, New York, and William Gottleib, one time a seller of aluminum goods, is interested in the enterprise.

Eastern Metal and Refining Company, Boston, Mass. Capital, $15,000. President, Edwin E. Farnham, Belmont, Mass.; vice-president, Wm. G. Roberts, Melrose, Mass.; treasurer, Austin T. White, Cambridge, Mass.; secretary, Wiley S. Young, Winthrop Mass.; attorney, Woodward Emery, 28 State street, Boston, Mass.

ART METAL CHANDELIER COMPANY, Salt Lake City, Utah. The company is formed to engage in the manufacture and sale of chandeliers and other metal goods. The capital stock is $10,000, divided into as many shares, valued at $1 each. Heber M. Wells is president; D. D. Moffatt, vice-president; W. Mont Ferry, secretary; H. L. Thomas, treasurer. These, with J. J. Snider, Paul R. Ruder and O. A. Tibbitts, form the board of directors.

STEEL ELECTROTYPE COMPANY, New York. Produce electro deposits of metal for plating, steel electrotypes and steel types, manufacture steel dies for stamping, etc. Capital, $300,000. Incorporators, August Leuchter, No. 192 Woodbine street, Brooklyn; Jacob Newman, No. 172 East 94th street; Henry Herzbrun, No. 319 West 116th street; Irwin Kurtz, No. 1970 Seventh avenue; Jesse J. Goldberg, No. 72 East 96th street, all of New York.

THE PITTSBURG WHITE METALS COMPANY, Pittsburg, Pa., which hitherto has been operated as a copartnership, was recently incorporated with a paid-in capital of $200,000. The stock is all owned by M. C. Rinehart, president of the new corporation, and E. E. Rinehart, Jr., secretary and treasurer. The company has branches in New York, Philadelphia and Boston, and is also represented in Cincinnati. The same line of metals made by the old company will be produced and the same general policy followed. A special feature will be made of "Armature" brand antifraction metal, which, the company states, is a bearing metal peculiarly adapted for use on engines, electrical machinery, rolling mills, and wherever good service under general conditions is required.

## PRINTED MATTER

ROLLER BEARINGS. The Standard Roller Bearing Company, of Philadelphia, Pa., have issued a 4-page pamphlet descriptive of their product and plant.

CHUCKS. The Skinner Chuck Company, of New Britain, Conn., have issued a blotter illustrating and describing their 1908 pattern Skinner Independent Lathe Chuck.

WHITE METALS. The Hoyt Metal Company, of New York City and St. Louis, Mo., are issuing a pamphlet describing their bearing metals and a souvenir postal card with a colored photograph of their plant.

FRICTION DRILL. The G. W. Fleming Company, Bradford, Pa., have issued a leaflet on their "Bradford Variable Speed Friction Drill." One lever controls the spindle feed, speed changes, starts and stops the spindle.

SUPPLIES. The Porter Tool and Supply Company, 100 William street, New York City, have issued a four-page pamphlet descriptive of their improved gear case, their list of railway supplies and their motor gears and pinions.

BRASS CANDLESTICKS. The W. D. Allen Manufacturing Company, Chicago, Ill., have issued circular No. 163 descriptive of their list of brass candlesticks which includes a great variety. All of the cuts are printed in yellow, representing brass.

GAS APPLIANCES. A 54-page loose-leaf catalogue issued by Fred K. Wells Company, 18 Warren street, New York City, describes a great variety of gas appliances, including furnaces used by metal workers, also ovens used in japanning and lacquering.

WIRE ROPE. The *American Wire Rope News*, published by the American Steel and Wire Company, Chicago, New York, Worcester, Denver and San Francisco, illustrates some of the applications of wire rope for elevators in the forest and aboard the arctic steamship *Roosevelt*.

CRUCIBLES. In the current issue of *Graphite*, the house organ published by the Joseph Dixon Crucible Company, of Jersey City, N. J., there is described a method of keeping crucible heat records. Also a summary of crucible heats on a test of the crucibles of the different makers.

METALLIC PAINT. The Protectus Company, Philadelphia and New York, have issued a 4-page leaflet announcing that C. H. Spotts and W. F. Swearer, formerly with the Joseph Dixon Crucible Company, Jersey City, N. J., are now associated with their firm and mention the merits of their paint.

STEEL FILING DEVICES. The Art Metal Construction Company, of Jamestown, N. Y., has issued a 24-page illustrated circular giving a series of views and descriptions of their fireproof steel furniture. This furniture is plated or japanned in a variety of finishes and it now includes all kinds of filing office furniture.

VALVES. A very presentable catalogue of 89 pages has been issued by the American Steam Gauge & Valve Maunfacturing Company, of Boston, Mass., giving all of the particulars about their valves. The catalogue also contains rules and regulations of the United States Board of Supervising Inspectors of steam vessels.

SHEARS. A very handsome catalog has been issued by the Farrel Foundry and Machine Company, of Ansonia, Conn., illustrating and describing their alligator, vertical and trimming shears, showing eight different sizes and types. The shears are used in rolling mills and all sorts of metal shops which have to cut up metal.

BLACK LACQUERS.—A black covered pamphlet has been issued by the Egyptian Lacquer Manufacturing Company, 152 Front Street, New York City, describing their varieties of dead black lacquers. Also information about spraying black lacquers. The pamphlet is interesting to all users and will be mailed to any address for the asking.

MACHINERY. The Manufacturers' Equipment Company, 23 N. Jefferson street, Chicago, Ill., have issued a catalogue in which are handsome illustrations and descriptions of turret lathe machinery, chucks, molding machines, gate valve seating machines, core wire extractors, etc. The equipment people are headquarters for brass working machinery.

AUTOMATIC POLISHING MACHINES. The Robinson Automatic Machicne Company, of Detroit, Mich., have issued a 16-page catalogue illustrative and descriptive of their automatic polishing machines. The first pages contain half-tone prints and particulars of the machines, and the last six pages contain letters fro mfirms that have used them.

ELECTRIC FURNACE PYROMETERS. The William H. Bristol Company, 45 Vesey street, New York City, have issued a two-page leaflet descriptive of their laboratory electric furnace and pyrometer outfit complete with patented quartz lined electric furnace and the W. H. Bristol recording pyrometer. The leaflet is of interest to chemists and metallurgists.

TIN PLATE. A very handsome catalogue has been issued by Follansbee Brothers Company, of Pittsburg, Pa. It is entitled "Tin Plate" and has fine half-tone plates and matter illustrating the process of tin plate making as carried on by the company's works. They announce that they are the only American manufacturers of hammered open hearth tin plate.

BRONZE WORK, BRONZE SIGNS. The Union Equipment and Bronze Company, New York City, have issued Builders' Supplement No. 1, which contains cuts and descriptions of this class of brass and bronze work manufactured by this firm. They make a specialty of theatrical brass work, balcony and box railings, cashier's wickets, guard railings, bronze signs and tablets, office railings, folding gates, electroliers, etc.

CORE COMPOUND. The S. Obermayer Company, Cincinnati, Ohio, have just issued a booklet on their core compound. The cover is illustrated with colored prints and the reading pages represent a juvenile foundryman at work in the various operations of making cores. For brass and aluminum founders the Obermayer Company recommend their No. 190 brass core compound at 80 to 1, and their peerless core compound at 30 to 1.

BRASS FOUNDRY SUPPLIES. The Brass Founders' Supply Company, of Newark, N. J., have issued Catalogue No. 14, which is the largest, handsomest and best catalogue they have put out describing their complete list of brass foundry supplies. The catalogue is nicely illustrated and printed on a high quality of paper and contains the latest and many styles of furnaces and other brass foundry appliances of the company. It is a catalogue which will make a handy reference for every brass founder.

## ADNEWS

The New Britain Machine Company, New Britain, Conn., is publishing some interesting information from month to month on their "Whitney" polishing lathe.

Pictoral advertising and picturesque language is a specialty of Frederic B. Stevens, of Detroit, Mich. For further particulars we refer our readers to our advertising pages.

A rolling mill with water circulation and a number of other special features is advertised for the first time by the Atlas Machine Company, 31 Canal street, Waterbury, Conn.

The W. S. Rockwell Company, 50 Church street, New York City, advertise what they assert to be the most perfect crucible melting furnace ever made, particulars of which will be found on another page.

The Wm. Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., have begun in this issue to advertise the sales which they hold at frequent intervals of turnings, scrap, skimmings, ashes, ingots, etc. They invite buyers of such material to send for specifications covering the next sale. At the last sale about 75 tons of material were disposed of.

## DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the report alone is $10. Sample copies furnished for the asking. We can also furnish daily telegraphic reports of metal prices.

## METAL MARKET REVIEW

New York, December 3, 1908.

COPPER.—Standard Copper in London shows a net advance for the month of £1 12s. 6d.; the Taft boom in metals and stocks ran prices up rather too rapidly for the legitimate business of the country. Spot copper in London was pushed up to nearly £65; this advance did not hold and the market closed at £63 17s. 6d. and dull and easy in tone.

In the New York market there was a good buying movement early in the month, and possibly for the first half of November and prices were advanced as long as the buying continued. With a little slackening of demand, copper from second hands and speculators came out and prices were lower again. The end of November has been dull and easier with the London price steadily declining. The exports for the month were 19,146 tons, against 34,087 in 1907, making a total for the eleven months of this year 268,153 tons, against 191,151 for the same period in 1907. The imports have been very heavy and will probably total 12,000 tons. The market closes dull but very firm. Lake, 14⅜ to 14.50; electrolytic, 14⅜ to 14.25; casting, 14 to 14⅛. The indications are that the larger selling agents will try to hold these prices for the balance of the year, and with renewed buying on the part of the consumers, prices will be pushed up again.

TIN.—The London market for tin has been highly speculative, prices were run up to £143 10s. in the boom, but closed £6 10s. below this high mark, and prices show a net decline for the month of £2 10s.

The New York market has followed the fluctuation of London, business has been fairly good, consumers came in freely during the early part of the month and the total deliveries for the month are estimated at 3,300 tons, an increase of 300 tons over October and an increase of 1,000 tons over the month of September. The shipments from the Straits were quite heavy, nearly 6,000 tons, and the total visible supply of tin at the end of November shows an increase of nearly 2,500 tons, and compared with a year ago the visible supply has increased 7,000 tons, these statistics are not very conducive for a "bull" market, but there are plenty in the trade that believe in higher prices for pig tin and base their sentiments on the increased consumption that is bound to come. The market closes at around 29 for 5-10 tons lots for spot delivery; futures are about ¼ cent per pound higher.

LEAD.—The London market for lead has been dull and easy, closing at a net decline for the month of about 5s.

The New York lead market has been dull and easy and towards the close of the month prices have sagged off on a report that the Trust would reduce prices to possibly a 4-cent basis. East St. Louis market closes carload lots New York delivery 4.35 and prices in St. Louis around 4.25.

SPELTER.—The foreign spelter market has been firm with steadily advancing prices, showing a net advance for the month of close to £1 10s.

The New York market has been strong and active with a good buying demand. Prices have advanced about ¼ cent per pound. Closing rather easier at 5.20 New York and around 5.00 to 5.05 East St. Louis.

ANTIMONY.—The London market has declined about 10s. during the month.

In New York the market has been dull and easier with prices at the close 15 points lower than a month ago. Cooksons, 8⅛; Halletts, 8.00; Hungarian grade around 7.60.

ALUMINUM.—The aluminum company have had to lower their price, owing to the steadily increasing importations and the constant cutting of prices. No. 1 ingots, 99 pure, in ton lots, 24 cents. Rods and wire, 33 cents, and sheet base is unchanged at 35 cents.

PLATINUM.—The market for platinum has been rather irregular owing to importations by outside interests. Prices at the close are lower and are quoted $22.50 to $23.50 for ordinary and $24.00 to $26.00 for hard. Scrap is worth $18.00 per ounce.

SILVER.—The London market has declined again, and prices have reached the lowest point in years, closing at a little above the lowest. Opening 23 1-16d. Closing 22 5-16d.

In New York prices have been weak and new low records have been recorded. Opening at 50 cents prices dropped to 48 cents and closed at 48⅜ cents.

QUICKSILVER.—The London price for quicksilver has advanced to £8 10s., with second hands asking £8 8s. 9d.

The New York price has been reduced by the Trust owing to importations by independent interests. Wholesale lots to-day $45.00, with jobbing lots at $46.00 per flask.

SHEET METALS.—Copper and brass sheet prices have been advanced about 1 cent base price, but the market is rather irregular, and there seems to be no fixed price as there used to be. Copper sheet is quoted at 19 cents base, 1 cent increase, and sheet brass at about 1 cent advance.

OLD METALS.—The old metal market went crazy over Taft, and the little boom in copper that followed "Bill's" election and prices were all lifted about 1 cent to 1½ cents per pound. Towards the close of the month prices sagged somewhat, and consumers did not come in at the advanced prices. At the close prices were about ½ cent per pound below the highest.

## THE NOVEMBER MOVEMENTS IN METALS

| | Highest. | Lowest. | Average. |
|---|---|---|---|
| COPPER | | | |
| Lake | 14.62¼ | 14.00 | 14.50 |
| Electrolytic | 14.50 | 13.75 | 14.25 |
| Casting | 14.37½ | 13.50 | 14.00 |
| TIN | 31.40 | 29.75 | 29.75 |
| LEAD | 4.50 | 4.35 | 4.40 |
| SPELTER | 5.15 | 4.85 | 5.05 |
| ANTIMONY (Halletts) | 8.25 | 7.90 | 8.00 |

**Trade Wants on Advertising Pages 23 and 24 Following**

# Metal Prices, December 7, 1908

## NEW METALS.

| | Price per lb. Cents |
|---|---|
| **Copper**—Pig, Bar and Ingot and Old Copper. Duty Free. Manufactured 2½c. per lb. | |
| Lake, car load lots | 14.50 |
| Electrolytic, car load lots | 14.25 |
| Castings, car load lots | 14.00 |
| **Tin**—Duty Free. | |
| Straits of Malacca, car load lots | 29.00 |
| **Lead**—Duty Pigs, Bars and Old, 2⅛c. per lb.; pipe and sheets, 2½c. per lb. | |
| Pig lead, car load lots | 4.35 |
| **Spelter**—Duty 1½c. per lb. | |
| Western, car load lots | 5.20 |
| **Aluminum**—Duty Crude, 8c. per lb. Plates, sheets, bars and rods, 13c. per lb. | |
| Small lots | 29.00 |
| 100 lb. lots | 26.00 |
| Ton lots | 25.00 |
| **Antimony**—Duty ¾c. per lb. | |
| Cookson's cask lots, nominal | 8.12½ |
| Hallett's, cask lots | 8.00 |
| Other cask lots | 7.60 |
| **Nickel**—Duty, 6c. per lb. | |
| Shot, Plaquettes, Ingots, Blocks, according to quantity | .45 to .60 |
| **Manganese**—Duty 20% | .80 |
| **Magnesium**—Duty free | 1.30 |
| **Bismuth**—Duty free | 1.80 |
| **Cadmium**—Duty free | 1.00 |
| | Price per oz. |
| **Gold**—Duty free | $20.67 |
| **Silver**—Duty free | .48⅜ |
| **Platinum**—Duty free | 25.25 |
| **Quicksilver**—Duty 7c. per lb. Price per pound | .65c. to 66c. |

## OLD METALS.

| | Price per lb. Cents. | |
|---|---|---|
| Heavy Cut Copper | 12.50 | 13.00 |
| Copper Wire | 12.50 | 13.00 |
| Light Copper | 11.00 | 11.50 |
| Heavy Mach. Comp. | 11.50 | 12.00 |
| Heavy Brass | 8.00 | 9.00 |
| Light Brass | 6.00 | 7.00 |
| No. 1 Yellow Brass Turnings | 8.00 | 8.50 |
| No. 1 Comp. Turnings | 9.75 | 10.00 |
| Heavy Lead | 4.00 | 4.10 |
| Zinc Scrap | 3.00 | 3.50 |
| Scrap Aluminum, turnings | 6.50 | 7.00 |
| Scrap Aluminum, cast, alloyed | 15.00 | 18.00 |
| Scrap Aluminum, sheet (new) | 18.00 | 20.00 |
| Old Nickel, solid | 19.00 | 23.00 |
| No. 1 Pewter | 18.00 | 19.00 |

## INGOT METALS.

| | | Price per lb. Cents. |
|---|---|---|
| Silicon Copper | according to quantity | 28 to 30 |
| Phosphor Copper, 5% | " " | 19 to 21 |
| Phosphor Copper, 10% to 15% Guaranteed | " " | 28 to 30 |
| Manganese Copper, 30% | " " | 30 to 35 |
| Phosphor Tin | " " | 34 to 36 |
| Brass Ingot, Yellow | " " | 10 to 11 |
| Brass Ingot, Red | " " | 12 to 14 |
| Bronze Ingot | " " | 11 to 13 |
| Manganese Bronze | " " | 17 to 19 |
| Phosphor Bronze | " " | 13 to 16 |
| Casting Aluminum Alloys | " " | 29 to 35 |

**Phosphorus**—Duty 18c. per lb.
According to quantity ..... 32 to 40

## PRICES OF HOT ROLLED SHEET COPPER.

| Sizes of Sheets. | | 64 oz. and over 50 lb. sheet 30 x 60 and heavier. | 32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60. | 24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60. | 16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60. | 14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60. | 12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60. | 10 oz. and 11 oz. 7⅝ to 9½ lb. sheet 30 x 60. | 8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60. | Lighter than 8 oz. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CENTS PER POUND. | | | | | | | | |
| Not wider than 30 ins. | Not longer than 72 inches. | 18 | 18 | 18 | 18 | 19 | 20 | 21 | 24 | 27 |
| | Longer than 72 inches. Not longer than 96 inches. | 18 | 18 | 18 | 18 | 19 | 21 | 24 | 27 | |
| | Longer than 96 inches. | 18 | 18 | 18 | 18 | 20 | 24 | | | |
| Wider than 30 ins. but not wider than 36 inches. | Not longer than 72 inches. | 18 | 18 | 18 | 18 | 20 | 22 | 25 | 28 | |
| | Longer than 72 inches. Not longer than 96 inches. | 18 | 18 | 18 | 18 | 20 | 24 | 27 | | |
| | Longer than 96 inches. Not longer than 120 inches. | 18 | 18 | 18 | 19 | 21 | | | | |
| | Longer than 120 inches. | 18 | 18 | 19 | 20 | | | | | |
| Wider than 36 ins. but not wider than 48 inches. | Not longer than 72 inches. | 18 | 18 | 19 | 20 | 22 | 25 | 28 | | |
| | Longer than 72 inches. Not longer than 96 inches. | 18 | 18 | 19 | 21 | 23 | 26 | | | |
| | Longer than 96 inches. Not longer than 120 inches. | 18 | 18 | 20 | 22 | 26 | | | | |
| | Longer than 120 inches. | 18 | 19 | 21 | 24 | | | | | |
| Wider than 48 ins. but not wider than 60 inches. | Not longer than 72 inches. | 18 | 18 | 19 | 21 | 24 | 29 | | | |
| | Longer than 72 inches. Not longer than 96 inches. | 18 | 18 | 20 | 22 | 27 | | | | |
| | Longer than 96 inches. Not longer than 120 inches. | 18 | 19 | 21 | 24 | | | | | |
| | Longer than 120 inches. | 19 | 20 | 22 | 26 | | | | | |
| Wider than 60 ins. but not wider than 72 ins. | Not longer than 72 inches. | 18 | 19 | 21 | 26 | | | | | |
| | Longer than 96 inches. Not longer than 120 inches. | 18 | 20 | 23 | 28 | | | | | |
| | Longer than 120 inches. | 19 | 21 | 26 | | | | | | |
| Wider than 72 ins. but not wider than 108 ins. | Not longer than 72 inches. | 19 | 21 | 24 | | | | | | |
| | Longer than 96 inches. Not longer than 120 inches. | 20 | 22 | 25 | | | | | | |
| | Longer than 120 inches. | 21 | 23 | 27 | | | | | | |
| Wider than 108 ins. | Not longer than 72 inches. | 22 | 24 | | | | | | | |
| | Longer than 132 inches | 23 | 26 | | | | | | | |

Rolled Round Copper, ⅝ inch diameter or over 18 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 3½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

## COPPER BOTTOMS, PITS AND FLATS.

| | |
|---|---|
| 14 oz. to square foot and heavier, per lb. | 22c. |
| 12 oz. and up to 14 oz. to square foot, per lb. | 23c. |
| 10 oz. and up to 12 oz. | 25c. |
| Lighter than 10 oz. | 28c. |

Circles less than 8 in. dia., 2c. per lb. additional.

Circles over 13 in. dia. are not classed as Copper Bottoms.

Polished Copper Bottoms and Flats, 1c. less per lb. extra.

| **Zinc**—Duty, sheet, 2c. per lb. | Price per lb. |
|---|---|
| Mill price, carload lots | 7.00 less 8% |
| Open casks | 8.50 |

# Metal Prices, December 7, 1908

## PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

**In effect Nov. 16, 1908, and until further notice.**

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

| | Net base per lb. | | |
|---|---|---|---|
| | High Brass. | Low Brass. | Bronze. |
| Sheet | $0.15 | $0.17¼ | $0.19⅜ |
| Wire | .15¼ | .17½ | .19⅝ |
| Rod | .15¼ | .17½ | .20⅝ |
| Brazed tubing | .21½ | — | .24⅝ |
| Open seam tubing | .19½ | — | .22⅝ |
| Angles and channels, plain | .20¾ | — | .24⅞ |

**30% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.**

**NET EXTRAS FOR QUALITY.**

Sheet—Extra spring, drawing and spinning brass... ¾c. per lb. net advance
" —Best spring, drawing and spinning brass.... 1½c. " " " "
Wire—Extra spring and brazing wire..... ¾c. " " " "
" —Best spring and brazing wire..... 1c. " " " "

**To customers who purchase less than 5,000 lbs. per year.**

| | Net base per lb. | | |
|---|---|---|---|
| | High Brass. | Low Brass. | Bronze. |
| Sheet | $0.16 | $0.18¼ | $0.20⅝ |
| Wire | .16¼ | .18½ | .20⅝ |
| Rod | .16¼ | .18½ | .21⅝ |
| Brazed tubing | .22½ | — | .25⅝ |
| Open seam tubing | .20½ | — | .23⅝ |
| Angles and channels, plain | .21¾ | — | .25⅞ |

**5% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.**

**NET EXTRAS FOR QUALITY.**

Sheet—Extra spring, drawing and spinning brass... ¾c. per lb. net advance
" —Best spring, drawing and spinning brass.... 1½c. " " " "
Wire—Extra spring and brazing wire..... ¾c. " " " "
" —Best spring and brazing wire..... 1c. " " " "

## BARE COPPER WIRE—CARLOAD LOTS.

15¾c. per lb. base.

## SOLDERING COPPERS.

300 lbs. and over in one order..... 18½c. per lb. base.
100 lbs. to 300 lbs. in one order..... 19c. " " "
Less than 100 lbs. in one order..... 20½c. " " "

## PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 19c. per lb.
Seamless Copper Tubing, 23c. per lb.

**For other sizes see Manufacturers' List.**

## PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

| Iron Pipe Size | ⅛ | ¼ | ⅜ | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 3½ | 4 | 4½ | 5 | 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Price per lb. | 27 | 26 | 21 | 20 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 20 | 21 | 23 | 25 | 26 |

## PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

| | Per 100 feet. | |
|---|---|---|
| | Brass. | Bronze. |
| ⅜ inch | $8 | $9 |
| ½ inch | 8 | 9 |
| ⅝ inch | 10 | 11 |
| ¾ inch | 12 | 13 |
| ⅞ inch | 14 | 15 |
| 1 inch | 18 | 20 |
| 1⅛ inch | 22 | 24 |
| 1¼ inch | 25 | 27 |
| 1½ inch | 32 | 35 |
| 1¾ inch | 45 | 48 |
| 2 inch | 56 | 60 |

Discount 45 and 5%.

## PRICES FOR MUNTZ METAL AND TOBIN BRONZE.

| | | |
|---|---|---|
| Muntz or Yellow Metal Sheathing (14" x 48") | 16c. | lb. net base |
| " " " Rectangular Sheets other than Sheathing | 18c. | " " " |
| " " " Rod | 17c. | " " " |
| Tobin Bronze Rod | 18c. | " " " |

Above are for 100 lbs. or more in one order.

## PLATERS' METALS.

Platers' bars in the rough, 24¼c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

## PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 4c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin.

## PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

| Wider than..... | 3in. | 6in. | 14in. | 16in. | 18in. | 20in. | 24in. | 30in. | 36in. |
|---|---|---|---|---|---|---|---|---|---|
| and including..... | 12in. | 14in. | 16in. | 18in. | 20in. | 24in. | 30in. | 36in. | 40in. |
| | In coils. | | | | | | | | |
| No. 13 and heavier | 36 | 36 | 38 | 38 | 38 | 38 | 41 | 41 | 41 |
| " 14 | 36 | 36 | 38 | 38 | 38 | 38 | 41 | 41 | 41 |
| " 15 | 36 | 36 | 38 | 38 | 38 | 38 | 41 | 41 | 41 |
| " 16 | 36 | 36 | 38 | 38 | 38 | 38 | 41 | 41 | 41 |
| " 17 | 36 | 36 | 38 | 38 | 38 | 38 | 41 | 41 | 41 |
| " 18 | 36 | 36 | 38 | 38 | 38 | 38 | 41 | 41 | 41 |
| " 19 | 36 | 36 | 38 | 38 | 38 | 38 | 41 | 42 | 45 |
| " 20 | 36 | 38 | 38 | 38 | 38 | 40 | 43 | 44 | 46 |
| " 21 | 36 | 40 | 40 | 40 | 40 | 42 | 45 | 46 | 52 |
| " 22 | 36 | 40 | 40 | 40 | 42 | 42 | 45 | 49 | 53 |
| " 23 | 36 | 40 | 40 | 40 | 42 | 42 | 45 | 51 | 54 |
| " 24 | 36 | 40 | 42 | 44 | 44 | 44 | 47 | 53 | 56 |
| " 25 | 38 | 41 | 43 | 45 | 45 | 45 | 48 | 55 | 59 |
| " 26 | 38 | 41 | 44 | 48 | 48 | 48 | 53 | 57 | 63 |
| " 27 | 38 | 42 | 46 | 50 | 50 | 51 | 56 | 60 | 66 |
| " 28 | 38 | 42 | 48 | 50 | 51 | 51 | 58 | 64 | 69 |
| " 29 | 40 | 43 | 50 | 52 | 54 | 54 | 63 | 69 | 74 |
| " 30 | 40 | 44 | 52 | 54 | 58 | 64 | 72 | 74 | 79 |
| " 31 | 45 | 49 | 57 | 60 | 65 | 73 | 76 | 79 | 85 |
| " 32 | 47 | 51 | 59 | 63 | 71 | 79 | 86 | 92 | 97 |
| " 33 | 49 | 53 | 62 | 67 | 75 | 86 | 93 | 102 | 112 |
| " 34 | 52 | 57 | 64 | 72 | 80 | 93 | 105 | 112 | 122 |
| " 35 | .. | 67 | 72 | 82 | 92 | 102 | 117 | 127 | .. |
| " 36 | .. | 82 | 92 | 102 | 117 | 122 | 137 | .. | .. |
| " 37 | .. | 106 | 110 | 131 | 146 | 161 | 176 | .. | .. |
| " 38 | .. | 126 | 141 | 156 | 171 | 186 | 206 | .. | .. |
| " 39 | .. | 146 | 166 | 186 | 206 | 226 | .. | .. | .. |
| " 40 | .. | 176 | 206 | 226 | 246 | .. | .. | .. | .. |

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

## PRICE LIST OF SEAMLESS ALUMINUM TUBING.

| Stubs' G. B. & S. G. | 1¼" | 1½" | 1¾" | 2" | 2¼" | 2½" | 2¾" | 3" | 3¼" | 3½" | 3¾" | 4" | 4¼" | 4½" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 to 11 | 3 to 9 | BASE PRICE 45 CENTS. | | | | | | | | | | 3 | 3 | 3 | 10 |
| 12 | 10 | | | | | | | | | | | 6 | 6 | 6 | 13 |
| 13 | 11 | | | | | | | | | | | 10 | 10 | 10 | 16 |
| 14 | 12 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 13 | 13 | 13 | 19 |
| 15 | 13 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 19 | 19 | 19 | 22 |
| 16 | 14 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 16 | 19 | 22 | 25 | 35 |
| 17 | 15 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 16 | 19 | 22 | 25 | 29 | 38 |
| 18 | 16 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 19 | 22 | 25 | 29 | 32 | 32 | 44 |
| 19 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 22 | 25 | 29 | 32 | 35 | 41 | 48 | 54 |
| 20 | 18-19 | 19 | 19 | 19 | 19 | 19 | 22 | 22 | 25 | 29 | 35 | 35 | 41 | 60 | 60 |
| 21 | 20 | 22 | 22 | 22 | 22 | 22 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 22 | 21 | 25 | 25 | 25 | 25 | 25 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 23 | 22 | 35 | 35 | 35 | 41 | 48 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 24 | 23 | 57 | 60 | 60 | 63 | 67 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 25 | 24 | 73 | 76 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

Prices are for ten pounds or more at a time. For prices on smaller sizes send for manufacturers' list.

## PRICE LIST FOR ALUMINUM ROD AND WIRE.

| Diameter. B. & S. G'ge. | 000 to No. 10. | No. 11. | No. 12. | No. 13. | No. 14. | No. 15. | No. 16. | No. 17. | No. 18. | No. 19. | No. 20. | No. 21. | No. 22. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Price, per lb. | 34 | 34½ | 34½ | 35 | 35½ | 36 | 36½ | 37 | 38 | 39 | 40 | 43 | 48 |

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

## PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

| Per cent. | Price per lb. | Per cent. | Price per lb. |
|---|---|---|---|
| 12 | $0.52 | 16 | $0.58 |
| 13 | .53 | 17 | .59 |
| 14 | .54 | 18 | .60 |
| 15 | .55 | | |

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

## GERMAN SILVER TUBING.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4 | per cent. | to No. | 19, | B. & S. | Gauge, | inclusive | $0.60 |
| 6 | " | " | 19, | " | " | " | .70 |
| 9 | " | " | 19, | " | " | " | .85 |
| 12 | " | " | 19, | " | " | " | 1.00 |
| 15 | " | " | 19, | " | " | " | 1.15 |
| 16 | " | " | 19, | " | " | " | 1.20 |
| 18 | " | " | 19, | " | " | " | 1.30 |

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

## PRICE OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quality and market conditions. No fixed quotations can be given as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. above the price of bullion for large buyers.


# TRADE WANTS


**AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.**

**Advertisements will be inserted under this head at 40 cents per line, 3 lines one dollar, for each insertion, excepting Situations Wanted, 20 cents per line, 3 lines half a dollar. Answers sent in our care will be forwarded.**

## METALS, MACHINERY AND SUPPLIES FOR SALE

**FOR SALE** Gutta Percha and Metals of all kinds
WALSH'S SONS & CO., Newark, N. J.

FOR SALE—One second hand HILL CRUSHER for BRASS FOUNDRY ASHES. In good condition. Address BOX 104, care THE METAL INDUSTRY.

FOR SALE.—A quantity of 4½ in. russet leather 18-ply buffs. Correspond with THE CRANE & BREED MANUFACTURING COMPANY, 1227 W. 8th Street, Cincinnati, Ohio.

## METALS, MACHINERY AND SUPPLIES WANTED

WANTED—To BUY several PRESSES suitable for STAMPING the various sheet metals in both deep and shallow work. Also other incidental MACHINERY for STAMPING plant. All MACHINERY must be in good condition. Give full particulars and best cash price. Address BOX 108, care THE METAL INDUSTRY.

WANTED—One second hand UNIVERSAL MILLING MACHINE. Must be in good order. Please state how long it has been used, price and location. Address BOX 109, care THE METAL INDUSTRY.

WANTED—To correspond with users of metal, .005 and thinner. For further particulars, address BOX 107, care THE METAL INDUSTRY.

WANTED—A GIB CRANE (hand power) that will lift minimum 10 tons, maximum height 15 feet with a swing of about 20 feet. Write, stating full particulars, to GIB CRANE, care THE METAL INDUSTRY.

**We PAY CASH for GOLD, SILVER and PLATINUM SCRAPS, SOLUTIONS and SWEEPINGS; Old Nickel Anodes, New or Old Mercury, Bismuth, Gas Mantle Dust and Chemicals, etc. EMPIRE CHEMICAL WORKS, 416 East 52d street, New York City.**

**CASH PAID for old precious metals and minerals in any form. Gas mantle dust, bronze powder, bismuth, platinum, mercury, nickel, etc. Address JOSEF RADNAI, 36 Fulton street, New York City.**

## REAL ESTATE

**MONEY TO LOAN**
in sums to suit on Real Estate, City or Country, anywhere in the United States, or Canada, at six per cent. interest. Two per cent. commission charged for placing loans. Will also make loans on yachts and vessel property. Address:
A. H. CRAWFORD, R. F. D. Route One, Box 60, Ellicott City, Maryland.

FACTORY TO RENT, BROOKLYN LOFT TO RENT—Complete Foundry in Brooklyn, including small Nickel Plating Plant, 3,600 square feet, first loft; steam heated, and 7 horse power, $1,500 a year. Additional horse power up to 50 horse power, at $35 per horse. Must be seen to be appreciated; any offer considered.
Light four sides, 38 windows, height of ceiling, 12 feet; also use of two furnaces, and core oven, and other machinery without extra expense. Water, three-quarters city rate, also watchman on premises; nothing like it in Brooklyn for the price. Address BOX 105, care THE METAL INDUSTRY, 61 Beekman street, New York City.

FACTORY TO RENT IN BROOKLYN—INTERESTING to Western Manufacturers who would like the opportunity to open an Eastern factory at small expense; would make a fine factory for metal stamping, metal plating, knife grinding machinery, or experimental shop.
Entire building, standing alone, 13 x 25 feet, including cellar, 975 square feet with 5 horse power, $35 a month, near Wallabout Market, Brooklyn; immediate occupancy. Twenty minutes from New York end of Brooklyn Bridge. Address BOX 106, care THE METAL INDUSTRY, 61 Beekman street, New York City.

FOR SALE—POLISHING and PLATING JOB SHOP in a Michigan city of 28,000 population; no competition. Bargain if taken at once. Reason for selling, other business. Equipment consists of one 5 horse power boiler for heating, one 5 horse power motor, two polishing lathes, good supply of polishing wheels, two plating dynamos (one 150 ampere and one 75 ampere), one 200 gallon nickel tank, one 250 gallon cyanide copper tank, one 75 gallon acid copper tank, one 140 gallon brass tank and one 60 gallon brass tank, also a good supply of anodes for all of these tanks. For further particulars, address BOX 110, care THE METAL INDUSTRY.

## OPPORTUNITIES

**British New Patents Act**
Advertiser is desirous of undertaking the manufacture of American patents in England. Stamped work of all description. Aluminum work a specialty.
**WILFRED & CO., Ltd.**
BIRMINGHAM, ENGLAND

**BRASS FOUNDERS**
Practical information bureau, 40 years' experience with trade secrets, from the furnace to the finisher. Work in all known metals, from common brass to the secret process of tempering copper. 40 formulas, worth a thousand dollars.
PREPAID TO ANY ADDRESS ON RECEIPT OF FIVE DOLLARS.
**JAMES ALLEN**
2552 J Street, : : : SAN DIEGO, CAL.

J. P. FANNING, Machinist, 678 Jefferson Avenue, Brooklyn, N. Y.—Maker of Moulds for Casting Solder, Babbitt Metal, Bar Lead, etc. We also manufacture small work. Write for particulars.

## INQUIRIES.

Inquiries received by THE METAL INDUSTRY for Metals, Machinery and Supplies. Further particulars may be obtained by addressing the inquiry number, care THE METAL INDUSTRY.

Inquiry No. 39.—We would like to hear from manufacturers of automatic buffing machines for polishing flat brass sheets.

Inquiry No. 40.—We are in the market for a solder and flux for soldering aluminum ware and should be pleased to hear from manufacturers of this product.

Inquiry No. 41.—We would like to correspond with firms who manufacture wood wheels for polishing.

## SITUATIONS OPEN

**WANTED**
TRAVELING SALESMEN for a BRASS and COPPER ROLLING MILL. Must be experienced and come well recommended; one familiar with trade in MIDDLE WEST preferred. Address in confidence, stating age, experience, salary desired, etc.
**ROLLING MILL, Care METAL INDUSTRY**

WANTED—FOREMAN in a large CHANDELIER works with a steady increasing business. Write, giving full particulars of ability, salary expected, etc. Address, TORONTO, care THE METAL INDUSTRY.

WANTED—FOREMAN PLATER. First class, steady, sober man wanted by a large METAL GOODS MANUFACTURER in New York. Must have full experience in ALL SOLUTIONS and FINISHES used on Britannia, Soft Metal, Brass and German Silver Goods. Must also be a good manager and be able to handle twenty-five hands to advantage. Good salary to the right man. Address with references, BOX 100, care THE METAL INDUSTRY.

WANTED—A shop FOREMAN for plant STAMPING and SPINNING the various metals in both deep and shallow work. Give full particulars as to experience, references, age and salary expected. Address BOX 101, care THE METAL INDUSTRY.

WANTED—To correspond with FOUNDRY FOREMEN who are in a position to sell our equipment. Write us for full information. Address BOX 102, care THE METAL INDUSTRY.

WANTED—FOREMAN to take charge of four MOLDING MACHINES in specialty foundry near New York having no regular molders. Must be willing to do the small amount of bench work required. For particulars address BOX 103, care THE METAL INDUSTRY.

WANTED—A first-class BRASS FINISHER who is capable of doing all round work. Must be sober, industrious and not afraid of work. Good wages and a permanent position to the right kind of a man. Address O-4, care THE METAL INDUSTRY.

WANTED—A first-class POLISHER and BUFFER who is capable of doing all round work. Must be a hustler and not afraid to work. Good wages and a permanent position to the right man. Address O-5, care THE METAL INDUSTRY.

**(Want Ads Continued on Next Page.)**


# TRADE WANTS


**AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.**

**Advertisements will be inserted under this head at 40 cents per line, 3 lines one dollar, for each insertion, excepting Situations Wanted, 20 cents per line, 3 lines half a dollar. Answers sent in our care will be forwarded.**

## SITUATIONS OPEN—Continued

WANTED—A first-class PATTERN FILER who is capable of doing all round bench work. Must be sober and a hustler. Address O-6, care THE METAL INDUSTRY.

WANTED—A man to take charge of a PLATING ROOM; a man with some mechanical ability who is a good plater on all solutions and who can handle some help. We will pay highest wages. Address O-25, care THE METAL INDUSTRY.

WANTED—A first class BRASS FOUNDRY FOREMAN capable of making a success in a foundry making BRASS VALVES and COCKS. One that can handle molding machines preferred. Factory located in western Pennsylvania. Highest wages will be paid the right party. State age and experience. Address BRASS VALVES, care THE METAL INDUSTRY.

## SITUATIONS WANTED

**Advertisements under this head will be inserted for 20 cents per line, 3 lines for Half a Dollar.**

SITUATION WANTED—By a FOREMAN PLATER who is an expert on NOVELTIES, BUCKLES, ETC. Thoroughly familiar with ALL SOLUTIONS and capable of taking charge of help. Address BOX 112, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER thoroughly understanding Cyanide Copper, Acid Copper, Brass, Bronze, Nickel, Gold and all the different finishes. Has had a large experience in job shop and manufacturing concerns. Not afraid to work, is a reliable man and hustler. Just the man you want and will go to any State. Thoroughly capable of taking charge of plant. Address BOX 113, care THE METAL INDUSTRY.

SITUATION WANTED—By a BRASS FOUNDRY FOREMAN with experience in steel and metal work. Can furnish the best of references. Address BOX 114, care THE METAL INDUSTRY.

SITUATION WANTED—By an experienced FACTORY and FOUNDRY MANAGER. Knows the capacities of men and can handle them to advantage without friction and can produce MAXIMUM OUTPUT at MINIMUM cost. Address BOX 115, care THE METAL INDUSTRY.

SITUATION WANTED—As SUPERINTENDENT or ASSISTANT SUPERINTENDENT of manufacturing plant, preferably in METAL GOODS. 20 years' experience, familiar with modern up-to-date methods of producing work at lowest possible cost. First class executive ability. Moderate salary. Can furnish best of references. Address BOX 116, care THE METAL INDUSTRY.

SITUATION WANTED—FOREMAN PLATER is open for engagement after January first. Young man with several years' experience. Familiar with ALL SOLUTIONS and FINISHES. Lowest salary $1,500 per year. Address BOX 117, care THE METAL INDUSTRY.

SITUATION WANTED—A first class ACCOUNTANT familiar with office work in the METAL TRADE. Can furnish the best of references. Address BOX 118, care THE METAL INDUSTRY.

SITUATION WANTED—FOREMAN PLATER would like to change position. Have had 18 years' experience on ALL SOLUTIONS and FINISHES. Fine work a specialty. Can furnish the best of references. Address BOX 119, care THE METAL INDUSTRY.

SITUATION WANTED—A first class BRASS FOUNDRY FOREMAN, up to date in all its branches. Has had 26 years' experience and thoroughly understands the business. Address Box 120, care THE METAL INDUSTRY.

SITUATION WANTED—By a BRASS FOUNDRY FOREMAN or SUPERINTENDENT with 20 years' experience. Well posted on molding machine work, also manganese bronze, phosphor bronze and aluminum castings. Also well posted on new and old metals and all kinds of automobile castings. Can furnish the best of references. Address BOX 121, care THE METAL INDUSTRY.

A FOUNDRY FOREMAN of 20 years' experience wants position. Is capable of taking charge of valve and plumbers' brass goods foundry; is experienced in mixing metals; has had charge for 6 years of plant melting 6 to 8 tons per day. Can furnish best of references. Address BOX 122, care THE METAL INDUSTRY.

SITUATION WANTED—BRASS FOUNDRY FOREMAN desires position. Twenty-five years' experience on high grade work. Well posted on MIXING and MELTING METALS, including aluminum and its alloys. Best of references. Address BOX 123, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER and POLISHER who wishes to change position. Is thoroughly experienced on all different lines of work and can furnish the best of references. Capable of handling a large shop. Address BOX 124, care THE METAL INDUSTRY.

SITUATION WANTED—Young man with executive ability wishes a position that would lead to promotion as Superintendent. Have knowledge of Chemistry and is a first class PLATER and POLISHER, also general mechanical ability. A student of shop practice, not afraid of work. Address BOX 125, care THE METAL INDUSTRY.

SITUATION WANTED—By an experienced BRASS FOUNDRY FOREMAN familiar with all branches and classes of work. A good MIXER, and can furnish the best of references. Address CU, 341 Genesee street, Rochester, N. Y.

SITUATION WANTED—By a BRASS FOUNDRY FOREMAN who is thoroughly familiar with the trade. Will go to any State where opportunities and chances for advancement are good. Address, BRASS, No. 3 Fanagert street, Rochester, N. Y.

## SITUATIONS WANTED—Cont'd.

SITUATION WANTED—By a FOREMAN PLATER thoroughly understanding Brass, Bronze, Cyanide Copper, Acid Copper, Nickel, Black Nickel, Silver, Electro and Dip Cold Solutions. Can produce Rose Green, Ivory, Roman Gold, Silver Oxidize and different finishes in the novelty and buckle line. Burnishing and Lacquering in all details. Address N-4, care THE METAL INDUSTRY.

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Burns, E. Reed, Brooklyn, N. Y.
Canning & Co., W., Birmingham, England.
Dow Chemical Mfg. Co., Mansfield, O.
Finkell-Hackmeister Chem. Co., Pittsburg, Pa.
General Chemical Co., Philadelphia, Pa.
Hanson & Van Winkle Co., Newark, N. J., and Chicago, Ill.
Illinois Zinc Co., Peru, Ill.
International Chemical Co., Camden, N. J.
Kemp, W. H., Co., New York.
L'Hommedieu, C. F., Sons Co., Chicago, Ill.
Mathiessen & Hegeler Zinc Co., La Salle, Ill.
New Jersey Zinc Co., New York.
Obermayer Co., The S., Cincinnati, O.
Sandoval Zinc Co., Chicago, Ill.
Stevens, Frederic B., Detroit, Mich.
Zucker & Levett & Loeb Co., New York.

**CORE COMPOUNDS.**
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Smith Foundry Supply Co., J. D., Cleveland, O.

**CORE OVENS.**
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Smith Foundry Supply Co., J. D., Cleveland, O.

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Gautier, J. H., & Co., Jersey City, N. J.
McCullough-Dalzell Crucible Co., Pittsburg, Pa.
Obermayer Co., The S., Cincinnati, O.
Paige Retort & Crucible Co., Taunton, Mass.
Richards & Co., Boston, Mass.
Ross-Tacony Crucible Co., Philadelphia, Pa.
Seidel, R. B., Inc., Philadelphia, Pa.
Taunton Crucible Co., Taunton, Mass.
Taylor, R. J., Inc., Philadelphia, Pa.
Waterbury Crucible Co., Waterbury, Conn.

**ELECTRIC FURNACES.**
Bristol Co., The, Waterbury, Conn.
Hoskins Co., The, Chicago, Ill.

**FIRE BRICK.**
Obermayer Co., The S., Cincinnati, O.
Paxson, J. W., Co., Philadelphia, Pa.
Smith Foundry Supply Co., J. D., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

**FIRE SAND.**
Carborundum Co., Niagara Falls, N. Y.

**FOUNDRY SUPPLIES.**
Birkenstein, S., & Sons, Chicago, Ill.
Doggett, Stanley, New York.
Foundry Specialty Co., Cincinnati, O.
Hawley Down Draft Furnace Co., Chicago, Ill.
Hill & Griffith Co., Cincinnati, O.
Obermayer Co., The S., Cincinnati, O.
Osborn Manfg. Co., Cleveland, O.
Paxson, J. W., Co., Philadelphia, Pa.
Shuster, F. B., Co., New Haven, Conn.
Smith Foundry Supply Co., J. D., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

**FURNACES, OIL, COAL, COKE OR GAS.**
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Hoe, R., & Co., New York.
Monarch Eng. and Mfg. Co., Baltimore, Md.
Obermayer Co., The S., Cincinnati, O.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.
Smith Foundry Supply Co., J. D., Cleveland, O.

**GALVANIZING, COLD, APPARATUS.**
Hanson & Van Winkle Co., Newark, N. J.
Zucker & Levett & Loeb Co., New York.

**GALVANIZING AND TINNING FURNACES.**
Rockwell Furnace Co., New York.

**GAS AND GASOLINE ENGINES.**
Otto Gas Engine Works, Philadelphia, Pa.

**GRINDING AND POLISHING MACHINERY.**
Ames Sword Co., Chicopee, Mass.
Bennett & O'Connell Co., Inc., Chicago, Ill.
Canning & Co., W., Birmingham, England.
Dow Chemical Mfg. Co., Mansfield, O.
Hanson & Van Winkle Co., Newark, N. J.
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New Britain Machine Co., New Britain, Conn.
Obermayer Co., The S., Cincinnati, O.
Osborn Mfg. Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.
United Wire & Supply Co., Providence, R. I.
Zucker & Levett & Loeb Co., New York.

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The Hoskins Co., Chicago, Ill.

**LACQUERS.**
Egyptian Lacquer Mfg. Co., New York.
Hanson & Van Winkle Co., Newark, N. J., and Chicago, Ill.
New Era Lustre Co., New Haven, Conn.
Nikolas, G. J., & Co., Chicago, Ill.

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Rockwell Furnace Co., New York.

**MACHINERY AND TOOLS.**
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Atlas Machine Co., Waterbury, Conn.
Baird Machine Co., Oakville, Conn.
Bates & Feard Annealing Furnace Co., New York.
Bliss, E. W., Co., Brooklyn, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.
Foster-Kimball Machine Co., Elkhart, Indiana.
Garrison, A., Foundry Co., Pittsburgh, Pa.
Moussette, O. J., Brooklyn, N. Y.
New Britain Machine Co., New Britain, Conn.
Otto Gas Engine Works, Phila., Pa.
Philadelphia Roll and Machine Company, Philadelphia.
Shuster, F. B., & Co., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.
Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.
Watson-Stillman Co., New York.

**MACHINERY, WIRE DRAWING.**
Baird Machine Co., Oakville, Conn.
Shuster, F. B., Co., New Haven, Conn.
Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.

**MACHINERY, WIRE FORMING.**
Baird Machine Co., Oakville, Conn.
Shuster, F. B., Co., New Haven, Conn.

**MAGNESIUM.**
Leavitt, C. W., Co., New York.

**MAGNETIC METAL SEPARATORS.**
Capitol Brass Works, Detroit, Mich.
Dings Electro-Magnetic Separator Co., Milwaukee, Wis.
Obermayer Co., The S., Cincinnati, O.
Paxson, J. W., Co., Philadelphia, Pa.

**METAL MELTING FURNACES.**
Hawley Down Draft Furnace Co., Chicago, Ill.
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Monarch Eng. and Mfg. Co., Baltimore, Md.
Obermayer Co., The S., Cincinnati, O.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.
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**METALS, NEW AND OLD.**
Aluminum Company of America, Pittsburg, Pa.
American Manganese Bronze Co., New York.
Birkenstein, S., & Sons, Chicago, Ill.
Clum & Atkinson, Rochester, N. Y.
Cramp, The Wm., & Sons Ship and Engine Building Co., Philadelphia, Pa.
Crescent Phosphorized Metal Co., Phila., Pa.
Culbert Co., J. C., Pawtucket, R. I.
Eagle Smelting & Refining Works, New York.
Electric Smelting & Aluminum Co., Lockport, N. Y.
Ellwood Ivins Tube Works, Phila., Pa.
Globe Metal Co., Chicago, Ill.
Hazard, Coates & Bennett Co., Rochester, N. Y.
Hegeler Brothers, Danville, Ill.
Hofelier, Theo., & Co., Buffalo, N. Y.
Hoyt Metal Co., New York.
Illinois Smelting & Refinery Co., Chicago, Ill.
Illinois Zinc Co., Peru, Ill.
Jackson, J. J., Co., Newark, N. J.
Lang, R. F., New York.
Leavitt, C. W., & Co., New York.
Malta Metal Co., Rochester, N. Y.
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
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Nassau Smel. & Refining Works, New York.
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Pittsburgh Smelting & Refining Co., Greensburg, Pa.
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Renziehausen, Wm. F., Co., Newark, N. J.
Richards & Co., Boston, Mass.
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Sandoval Zinc Co., Chicago, Ill.
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St. Joseph Lead Co., New York.
Sterling Smelting Wks., Brooklyn, N. Y.
U. S. Reduction Co., Chicago, Ill.
Whipple & Choate, Bridgeport, Conn.

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# THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD. THE BRASS FOUNDER AND FINISHER
AND ELECTRO-PLATERS REVIEW
and COPPER AND BRASS

REGISTERED IN U. S. PATENT OFFICE.

A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

ALUMINUM · COPPER · METALLOGRAPHY · BRASS · METALLURGY · NICKEL · SILVER · GOLD · TIN · LEAD · ZINC · BRONZE

¶ The January Number of THE METAL INDUSTRY will contain articles by the leading writers of the world—Metallurgical, Mechanical, Chemical.

¶ The department and reference matter published in the January number will be of such a nature that the paper will be a Daily Buyer's Guide for the entire year.

¶ An advertisement in this January number will reach more metal shops (not iron), will attract more attention and will bring more results than anything else printed. A trial is convincing.

OLD SERIES FOUNDED OCT., 1894 FOUNDED JAN., 1903 NEW SERIES

LABOR OMNIA "LABOR CONQUERS EVERYTHING" VINCIT

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